DICOM Conformance Statement

YSIO X.pree VA20D (and higher)

March 2025

SIEMENS Healthineers

1 Overview

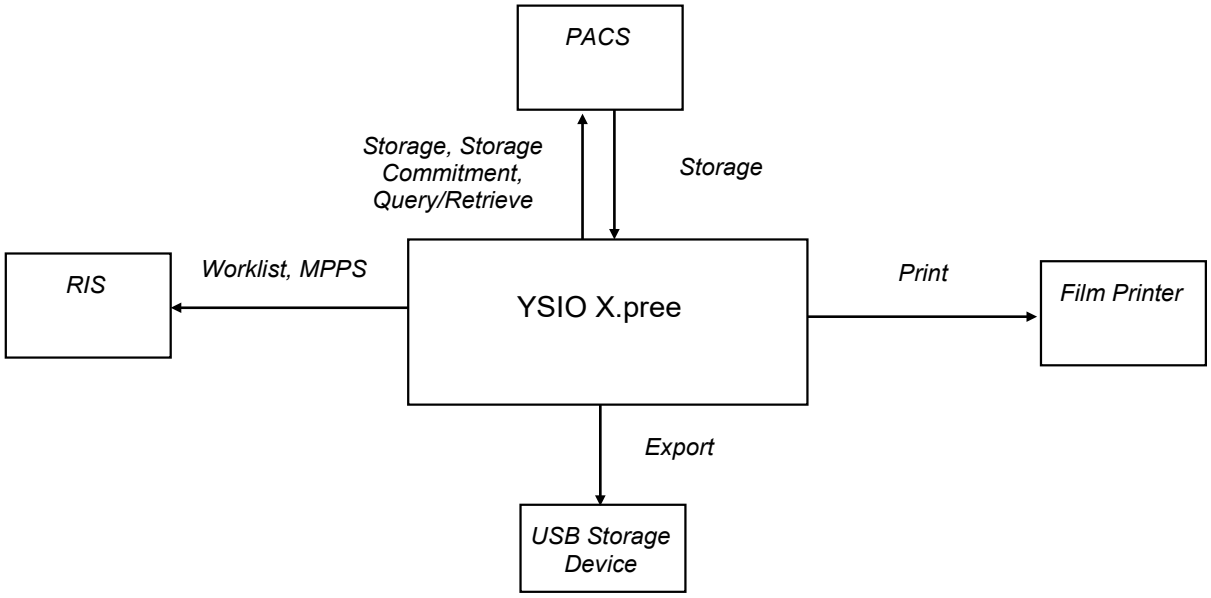
YSIO X.pree is a high-end digital radiography system and a new kind of X-ray solution.

Equipped with next- generation intelligence, it redefines the way you manage clinical workload. YSIO X.pree offers myExam Companion functionalities – turning data into expertise and leveraging the full potential of both the technology and its operators. YSIO X.pree comes with a streamlined and easy-to-use interface, a 3D camera for patient positioning and advanced collimation, and a smart image processing engine.

For acquired images it utilizes the DICOM "Digital X-Ray Image Storage" classes and "X-Ray Radiation Dose SR Storage" for automatically generated Dose Reports. YSIO X.pree can also handle other DICOM image objects like "CT Image" or "MR Image" utilizing the DICOM "Query/Retrieve Service Class". Workflow Management is supported by querying worklists and returning information about the procedure performed. Furthermore, the import from and export to DICOM USB media and printing to a DICOM printer is supported.

YSIO X.pree conforms to the DICOM Standard and supports the network services as described this chapter.

Figure 1 1: Overview of Implemented Services



1.1 Content and Transfer

Table 1.1-1 lists all Storage SOP Classes and the supported transfer mechanisms as well as the usage scenarios for those instances.

The “Transfer Syntax Set” column lists the sets of Transfer Syntaxes defined in

Table 1.1-2 that are applicable to each SOP Class. The “DIMSE”, “DICOM Web” and “Media Services” columns indicate the roles supported for each SOP Class.

The “Function” columns indicate how the instances are used by the system:

- Create: The system creates instances of the SOP Class. The type of the created SOP Class is indicated by one of the following abbreviations:
  - S: Standard SOP Class
  - SE: Standard Extended SOP Class
  - SP: Specialized SOP Class
  - P: Private SOP Class
- Display: The system displays the instances of the SOP Class to the user, either by displaying the SOP Instances natively or by applying instances of another suitable SOP Class to the image instances (e.g., a Presentation State or CAD SR).
- Process: The system processes the instances of the SOP Class to derive some further information that is made available to the user (e.g., a CAD processing algorithm, or a 3D Rendering).
- Archive: The system stores the instances of the SOP Class and makes them available again.

Table 1.1-1: Storage SOP Classes

SOP Classes		Transfer Syntax Set	DIMSE Services		Media Services			Function			
			SCU	SCP	FSC	FSU	FSR	Create	Display	Process	Archive
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	C,U	Y	Y	Y	N	Y	SE	Y	N	Y
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	C,U	Y	Y	Y	N	Y	SE	Y	N	Y
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	C,U	Y	Y	Y	N	Y	SE	N	N	Y
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	C,U	Y	Y	Y	N	Y		Y	N	Y
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	C,U	Y	Y	Y	N	Y		Y	N	Y
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	C,U	Y	Y	Y	N	Y		Y	N	Y
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	C,U	Y	Y	Y	N	Y		Y	N	Y
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	C,U	Y	Y	Y	N	Y		Y	N	Y
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	C,U	Y	Y	Y	N	Y		Y	N	Y
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	C,U	Y	Y	Y	N	Y		Y	N	Y
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	C,U	Y	Y	Y	N	Y		Y	N	Y
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	C,U	Y	Y	Y	N	Y		Y	N	Y

SOP Classes		Transfer Syntax Set	DIMSE Services		Media Services			Function			
			SCU	SCP	FSC	FSU	FSR	Create	Display	Process	Archive
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	C,U	Y	Y	Y	N	Y		Y	N	Y
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	C,U	Y	Y	Y	N	Y		Y	N	Y
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	C,U	Y	Y	Y	N	Y		Y	N	Y
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	C,U	Y	Y	Y	N	Y		Y	N	Y
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	U	Y	Y	Y	N	Y	See Table 1.1-3 .			

Table 1.1-2: Supported Transfer Syntaxes

Transfer Syntax Set	Transfer Syntax Name	Transfer Syntax UID
Compressed Transfer Syntax Set (C)	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
	JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
	JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
	RLE Lossless	1.2.840.10008.1.2.5
Uncompressed Transfer Syntax Set (U)	Implicit VR Little Endian	1.2.840.10008.1.2
	Explicit VR Little Endian	1.2.840.10008.1.2.1
	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2

1.1.1 Structured Reporting Root Template IDs

Table 1.1-3 lists all Template IDs (TID) of Root Templates that are supported by the system. The “Function” column indicates how the system uses the content of the DICOM SR:

- CREATE: The system creates instances using the specified TID.
- RENDER: The system displays the content of the SR, without using the data for any processing.
- EXTRACT_DATA: The system can extract structured data from the content and use the data for subsequent processing (e.g. reporting).
- OVERLAY: The system uses the information in the SR to display information directly on the images (e.g. Mammography CAD markers).
- ARCHIVE: The system stores instances for later retrieval.

The “SOP Class UID” column indicates which of the SR Storage SOP Classes are used to encode the information or to store it. If multiple SOP Classes are supported the “Condition” column describes the conditions for using the different SOP Classes.

Table 1.1-3: Supported Root SR Template IDs (TID)

Name	Root TID	Function	SOP Classes		Condition
Projection X-Ray Radiation Dose (TID 10001)	10001	CREATE, RENDER, ARCHIVE	X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	

1.2 DIMSE Services

1.2.1 Verification

Table 1.2-1 lists support for the Verification SOP Class.

Table 1.2-1: Verification SOP Class

SOP Classes		Transfer Syntax		SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y

1.2.2 Storage

For details on supported Storage SOP Classes see section 1.1.

1.2.3 Workflow Management

Table 1.2-2 lists all supported Workflow Management SOP Classes.

Table 1.2-2: Workflow Management SOP Classes

SOP Classes		Transfer Syntax		SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N

1.2.4 Query/Retrieve

Table 1.2-3 lists all supported Query/Retrieve SOP Classes.

Table 1.2-3: Query/Retrieve SOP Classes

SOP Classes		Transfer Syntax		DIMSE	
				SCU	SCP
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	Y
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	Y
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	Y
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	Y
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	N	Y
		Explicit VR Little Endian	1.2.840.10008.1.2.1	N	Y
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	N	Y

SOP Classes		Transfer Syntax		DIMSE	
				SCU	SCP
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	N	Y
		Explicit VR Little Endian	1.2.840.10008.1.2.1	N	Y
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	N	Y
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	N	Y
		Explicit VR Little Endian	1.2.840.10008.1.2.1	N	Y
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	N	Y
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian	1.2.840.10008.1.2	N	Y
		Explicit VR Little Endian	1.2.840.10008.1.2.1	N	Y
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	N	Y

1.2.5 Printing

Table 1.2-4 lists all supported Printing SOP Classes.

Table 1.2-4: Printing SOP Classes

SOP Classes	SOP Class UID	Transfer Syntax		SCU	SCP
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2.1	Y	
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Print Job SOP Class	1.2.840.10008.5.1.1.14	Implicit VR Little Endian	1.2.840.10008.1.2	Y	
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Implicit VR Little Endian	1.2.840.10008.1.2	Y	

1.3 Media Services

Table 1.3-1 lists all supported Media Application Profiles.

Table 1.3-1: Supported Media Application Profiles

Media Storage Application Profile	FSC	FSR	FSU
USB			
STD-GEN-USB-J2K	Y[1)]	Y	Y
AUG-GEN-USB-J2K	Y	Y	Y

[1)] The STD profiles only apply if High Profile Data Minimization is applied (which removes all the Private DICOM Attributes). This can be combined with any compression setting (except for STD-GEN-CD).

These Application Profiles are based on the Media Storage Service Class with the Interchange Option.

YSIO X.pree provides Standard Conformance to the SOP Classes listed in Table 1.1-1 marked accordingly in main column „Media Services".

1.4 De-Identification Profiles

De-Identification as described in DICOM PS3.15 is not supported. To protect PHI/PII a Data Minimization mechanism as described in Section 8.6 is implemented.

1.5 Specific Character Sets

Table 1.5-1: Supported Specific Character Sets

Defined Term	Code	Description
Single-Byte Character Sets without Code Extensions		
ISO_IR 6	ISO-646	Default Repertoire
ISO_IR 100	ISO-8859-1	Latin Alphabet No. 1 (West European)
ISO_IR 101	ISO-8859-2	Latin Alphabet No. 2 (Central European)
ISO_IR 109	ISO-8859-3	Latin Alphabet No 3 (South European)
ISO_IR 110	ISO-8859-4	Latin Alphabet No 4 (North European)
Multi-Byte Character Sets without Code Extensions		
GB18030	GB18030	GB18030-2000 (P.R China Norm GB18030)
ISO_IR 192	ISO 10646	Unicode in UTF-8

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3 Introduction

3.1 Revision History

Revision	Date	Product Version(s)	Change
1.0	February 2025	VA20D	Initial Revision

3.2 Audience

This document is intended for the audience listed below. It is assumed that the reader has a working knowledge of the DICOM Standard.

The document structure was designed for easier access to relevant information for different user groups:

Clinical Users, who want to get an overview of the implemented interoperability features of the system can see section 4 Implementation Model.

Personnel involved in **Sales** can use the information in Section 1 to assess the compatibility between different systems involved in a sales situation.

System Integrators can use information in Section 6 during system installation and also information from Section 5 Service and Interoperability Description for details regarding the implemented services.

Field Service Engineers can use the details from Section 5 Service and Interoperability Description and from Section 7 Network and Media Communication Details for troubleshooting.

Hospital IT staff focusing on security can use the details provided in Section 8 Security regarding implemented Security features.

Research Personnel may be interested in using information provided in Annex A Information Object Definitions (IODs) or Annex B Structured Report Content Encoding to get detailed imaging and measurement information.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between YSIO X.pree and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability.

The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement should not replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, it is the user's responsibility to perform the following validation activities:

The comparison of Conformance Statements from YSIO X.pree and other DICOM conformant equipment is the first step towards assessing interconnectivity and interoperability between those systems.

Test procedures should be defined and executed to validate the required level of interoperability with specific DICOM conformant equipment, as established by the healthcare facility.

Siemens Healthineers reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens Healthineers representative for the most recent product information.

3.4 Terms and Definitions

The following list includes DICOM Terms, that are used throughout this conformance statement:

Abstract Syntax	The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.
Application Entity (AE)	A representation of the external behavior of an application process in terms of DICOM Network Services, Web Services and/or media exchange capabilities implemented in one or more roles. A single device may have multiple Application Entities.
Application Entity Title (AET)	The externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.
Application Context	The specification of the type of communication used between Application Entities. Example: DICOM network protocol.
Association	A network communication channel set up between Application Entities.
Attribute	A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower-level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).
DIS	Departmental Information System
Information Object Definition (IOD)	The specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. Examples: MR Image IOD, CT Image IOD, Print Job IOD. The Attributes within an IOD may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C).
Media Application Profile	The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs).
Module	A set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient's Name, Patient ID, Patient' Birth Date, and Patient's Sex.
Negotiation	First phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.
Origin Server	Refers to the program that can originate authoritative responses to HTTP requests for a given Target Resource. The term "server" refers to any implementation that receives a web service request message from a user agent.
Presentation Context	The set of DICOM Network Services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.
Private SOP Class	A SOP Class that is not defined in the DICOM Standard but is published in an implementation's Conformance Statement.
Protocol Data Unit (PDU)	A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.
Security Profile	A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.
Service Class Provider (SCP)	Role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU)	Role of an Application Entity that uses a DICOM Network Service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).
Service/Object Pair Class (SOP Class)	The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.
Service/Object Pair Instance (SOP Instance)	An information object: a specific occurrence of information exchanged in a SOP Class. E.g., a specific X-ray image.
Specialized SOP Class	A SOP Class that is derived from the Standard that is specialized by additional type 1, 1C, 2, 2C, or 3 Attributes by enumeration of specific permitted Values for Attributes, or by enumeration of specific permitted Templates. The additional Attributes may either be drawn from the Data Dictionary in PS3.6 or may be Private Attributes.
Standard SOP Class	A SOP Class defined in the Standard, and that is implemented and used without any modifications.
Standard Extended SOP Class	A SOP Class that is defined in the standard, and that is extended by additional type 3 Attributes. The additional Attributes may either be drawn from the DICOM Data Dictionary in PS3.6 or may be Private Attributes.
Tag	A 32-bit identifier for a data element, represented as a pair of four-digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].
Transfer Syntax	The encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), Little Endian Explicit Value Representation.
TLS-Secured Port	TCP port on which an implementation accepts TLS connections to exchange DICOM information.
Unique Identifier (UID)	A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.
User Agent	A client in a network protocol used in communications within a client–server distributed computing system. In particular, the Hypertext Transfer Protocol (HTTP) identifies the client software originating the request, using a user-agent header, even when the client is not operated by a user.
Value Representation (VR)	The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.
Logging	Activity records, which are public and do not contain PHI and PII, just technical data to help to find out afterwards, what exactly happened or to the root cause of eventual issues. The logging cannot be switched off.
Tracing	A detailed, code level activity record, which can only be used for debugging purposes. Tracing is switched off by default. Switching the tracing on will affect the performance and a warning is going to be displayed on the GUI with the text “Nor for clinical use”.

3.5 Abbreviations

Abbreviations that are used in this DICOM Conformance Statement are listed here.

AE	Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CID	Context Identifier
DCS	DICOM Conformance Statement
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIS	DICOM Information System
ELE	Explicit VR Little Endian
FSC	File-Set Creator
FSR	File-Set Reader
FSU	File-Set Updater
GSDF	Grayscale Standard Display Function
IANA	Internet Assigned Numbers Authority
IHE	Integrating the Healthcare Enterprise
ILE	Implicit VR Little Endian
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
n.a.	not applicable
NEMA	National Electrical Manufacturers Association
NTP	Network Time Protocol
O	Optional Key Attribute
OID	Object Identifier
OS	Origin Server
PDU	Protocol Data Unit
PHI	Protected Health Information
PII	Personal Identifiable Information
PPS	Performed Procedure Step
R	Required Key Attribute
RIS	Radiology Information System
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
TFT	Thin Film Transistor (Display)
TID	Template Identifier
U	Unique Key Attribute

UA	User Agent
UI	User Interface
UID	Unique Identifier
UL	Upper Layer
UPS	Unified Procedure Step
UTF-8	Unicode Transformation Format-8
VR	Value Representation

3.6 References

NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA
(available at http://www.dicomstandard.org/current)

IHE Radiology Technical Framework
(available at https://www.ihe.net/Resources/technical_frameworks/#radiology)

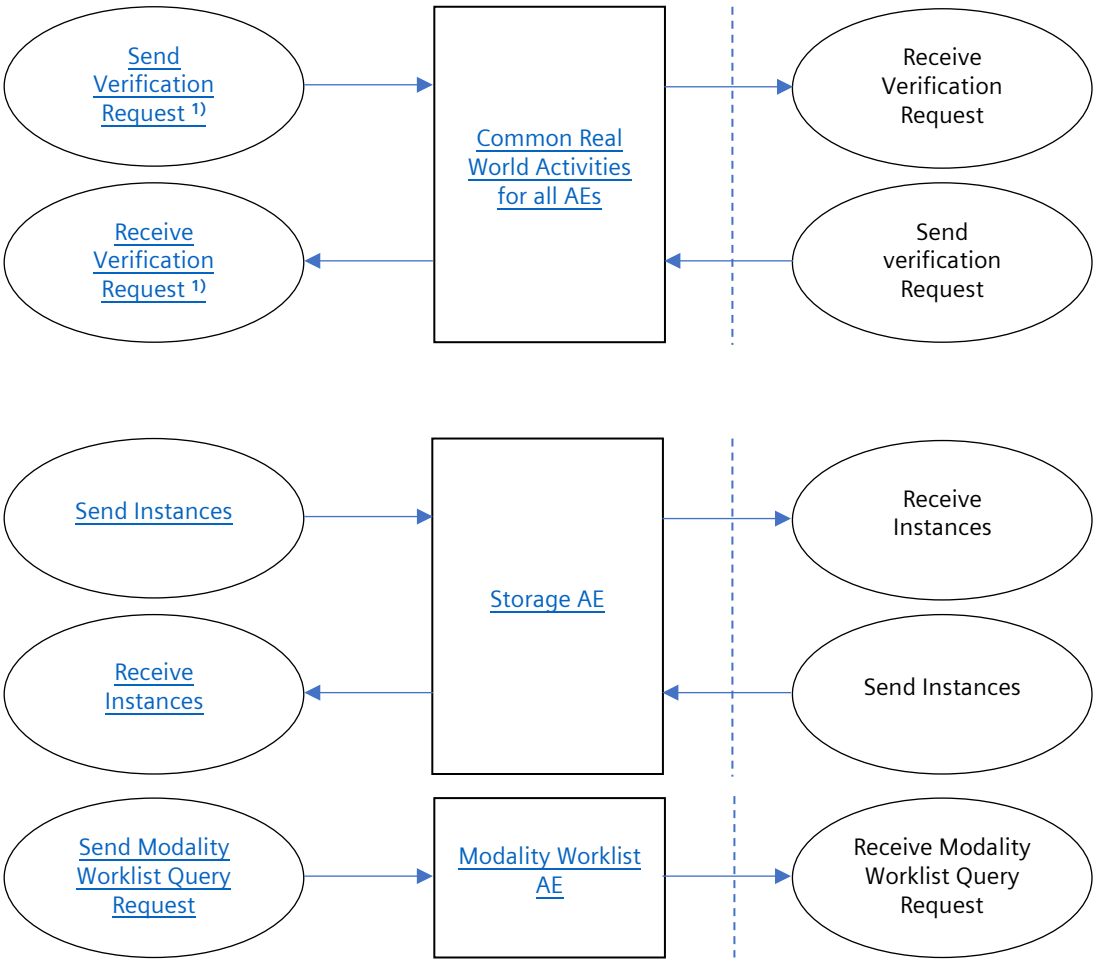
4 Implementation Model

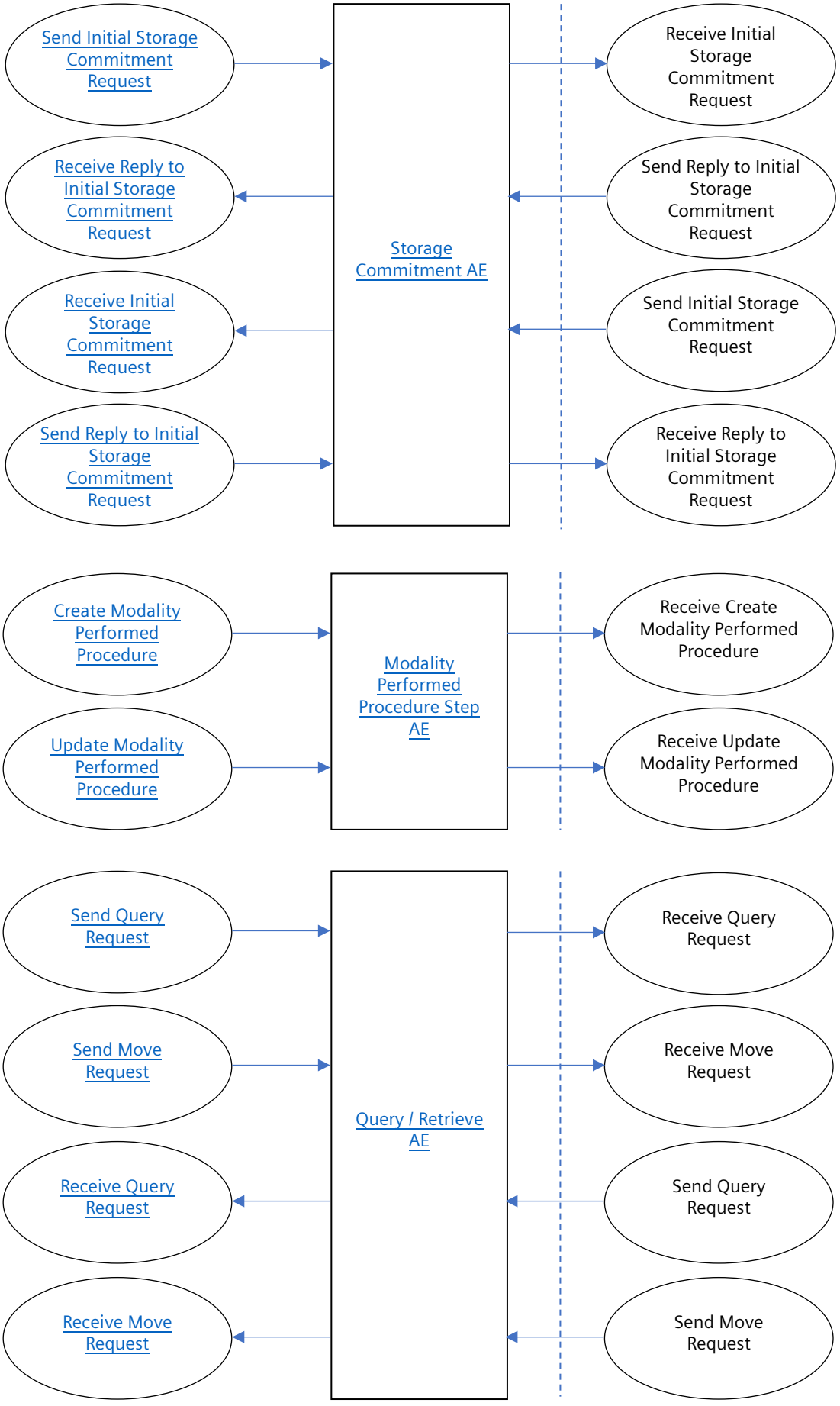
YSIO X.pree supports storing DICOM images to remote nodes like workstations or archiving systems. Using the Storage Commitment Service it can request safe keeping of previously stored instances from an archiving system. Additionally YSIO X.pree can query remote notes, retrieve, and store selected instances from that node. Using the Modality Worklist Service YSIO X.pree can query a HIS/RIS for scheduled procedures. Performed Procedure Step status and other procedure data can be returned to the HIS/RIS using the Modality Performed Procedure Step (MPPS) Service. Furthermore printing of color and grayscale images is supported. YSIO X.pree also provides the functionality to Import or Export DICOM Instances from and to the File System.

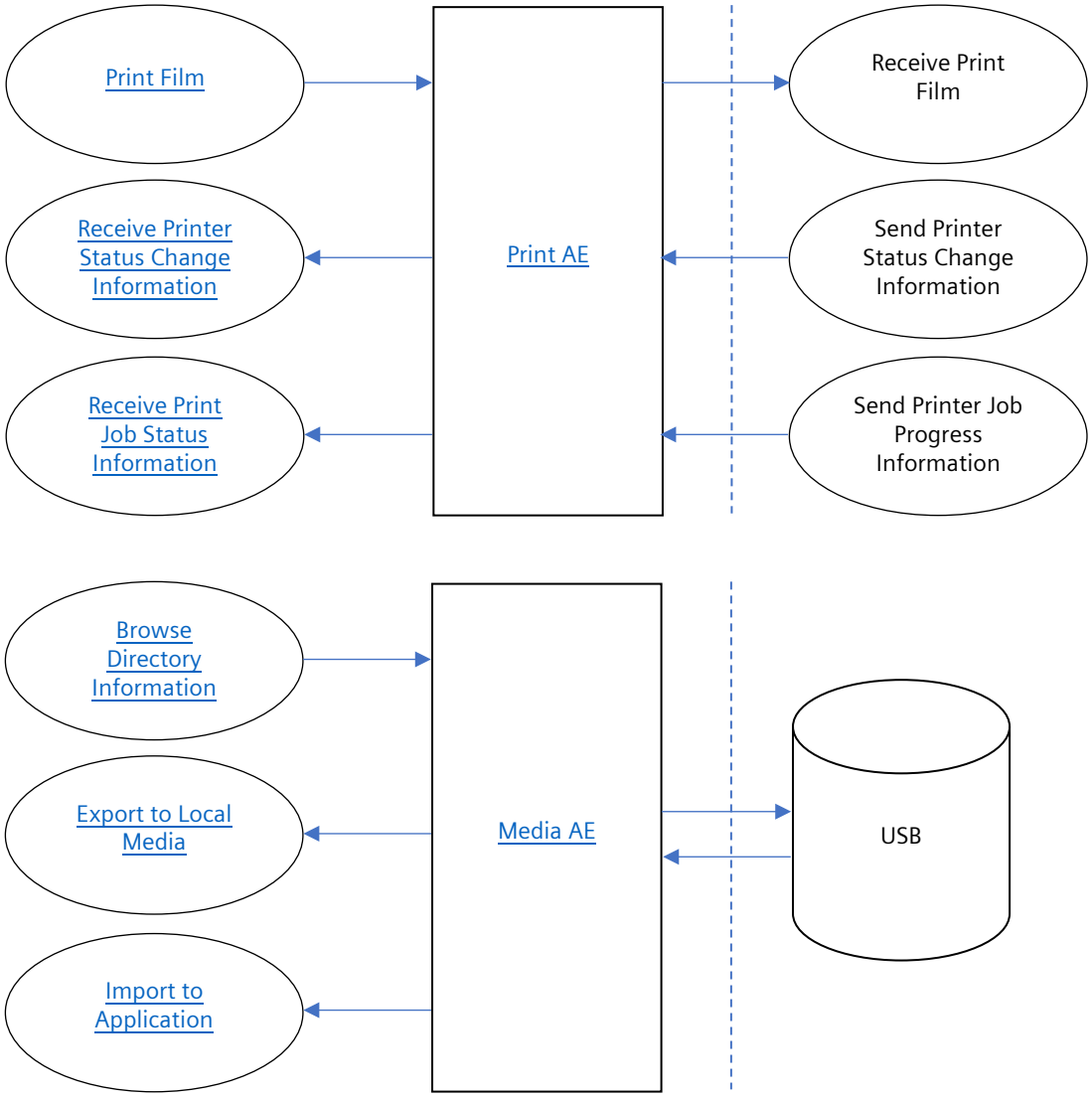
4.1 Application Entities and Data Flow

The network and media interchange application model for YSIO X.pree is shown in

Figure 4.1-1: YSIO X.pree Application Data Flow Diagram




Send Initial Storage Commitment Request
Receive Reply to Initial Storage Commitment Request
Receive Initial Storage Commitment Request
Send Reply to Initial Storage Commitment Request
Storage Commitment AE
Receive Initial Storage Commitment Request
Send Reply to Initial Storage Commitment Request
Send Initial Storage Commitment Request
Receive Reply to Initial Storage Commitment Request
Create Modality Performed Procedure
Update Modality Performed Procedure
Modality Performed Procedure Step AE
Receive Create Modality Performed Procedure
Receive Update Modality Performed Procedure
Send Query Request
Send Move Request
Receive Query Request
Receive Move Request
Query / Retrieve AE
Receive Query Request
Receive Move Request
Send Query Request
Send Move Request



[1] The "Send Verification Request" and "Receive Verification Request" Activities are supported by each AE using DIMSE services. For ease of documentation these activities are described once at the beginning of the diagram.

YSIO X.pree allows flexible configuration of services into Application Entities. The diagram above describes the most detailed configuration possible. This can vary at customer sites depending on the local setup.

The SCU components of the Application Entity are invoked upon requests from the user interface or indirect by trigger from internal processes.

The SCP components of the Application Entities of YSIO X.pree described in the following subsections operate as background server processes. They exist as soon as the system is powered up and wait for association requests. Upon accepting an association with a negotiated Presentation Context they start to receive and process the requests described in the following sections.

4.1.1 Functionality Common to all AE

YSIO X.pree supports the Verification Service as an SCP and SCU. As an SCU, Verification can be activated from the Administrator Portal during system configuration by sending a C-ECHO-RQ for each configured AE.

As an SCP of the Verification Service YSIO X.pree each AE processes and responds to incoming verification requests using the C-ECHO-RSP.

4.1.2 Functional Definition of Storage AE

YSIO X.pree SCU of the Storage AE is invoked directly by the user, by an auto-archive trigger or internally by the Query/Retrieve Application Entity that is responsible for processing retrieve requests. The job consists of data describing the composite objects selected for Storage and the destination Application Entity Title. An association is negotiated with the destination Application Entity and the imaging data is transferred using the C-STORE-RQ. The transfer status is reported to the initiator of the Storage request.

The SCP of the Storage AE of YSIO X.pree starts to receive the Composite Objects and imports them into the database after accepting an association with a negotiated Presentation Context. The system responds to the Storage Request immediately after reception of the Data.

4.1.3 Functional Definition of Storage Commitment AE

If configured, YSIO X.pree can serve as an SCU for the DICOM Storage Commitment Service. Upon successful completion of a Storage SCU job, the system uses the N-ACTION-RQ to request Storage Commitment from a remote DICOM Storage Commitment SCP. This can either be the same as the Storage destination or a different system depending on the system configuration. Storage Commitment Requests are sent after a configurable delay after storing the objects. YSIO X.pree can receive the N-EVENT-REPORT-RQ on the same or a different association. In this case a reverse role negotiation takes place.

4.1.4 Functional Definition of Query/Retrieve AE

YSIO X.pree supports DICOM Query/Retrieve as an SCU: The user can initiate a query to a remote node using the C-FIND-RQ. After matching the specified keys, the remote Query/Retrieve SCP uses the C-FIND-RSP to return the results of its search, which will be displayed to the user. Depending on user action YSIO X.pree Query/Retrieve DICOM SCU sends a C-MOVE-RQ to initiate a C-STORE sub-operation on the SCP to start an instance transfer from remote Storage SCU (running on Query/Retrieve SCP) to the system's Storage SCP.

Furthermore, the SCU Services may issue relational queries, if supported by the remote Query/Retrieve SCP node and required by the querying Application. The same set of keys are used as in the Study Root Query Model.

YSIO X.pree leaves the Association for the C-MOVE-RQ from the SCU side open until all requested data has arrived. The timeout is by default 20 minutes (which is configurable in the template of the Remote Node, which includes the option of no waiting time).

YSIO X.pree provides the possibility to configure what is considered "all requested data has arrived".

YSIO X.pree supports on the SCP side the Patient Root Query Information Model, Study Root Query Information Model and the retired Patient/Study Only Query Information Model. On the SCU side only the Study Root Query Information Model is supported.

YSIO X.pree DICOM Query/Retrieve SCP accepts C-FIND RQ, queries the local database based on the provided matching keys and returns the matches in the C-FIND-RSPs. Depending on further request from the remote Query/Retrieve SCU, YSIO X.pree responds to C-MOVE-RQs by initiating a C-STORE sub-operation to send image objects to the Storage SCP of the querying system.

4.1.5 Functional Definition of Modality Worklist AE

YSIO X.pree Modality Worklist SCU issues DICOM Modality Worklist requests using C-FIND-RQs. The results in the C-FIND-RSPs are stored in internal database. The provided Patient and Procedure information is used for patient registration prior to starting an exam.

4.1.6 Functional Definition of Modality Performed Procedure Step AE

The YSIO X.pree MPPS SCU uses the N-CREATE-RQ to inform an Information System that a procedure step is IN PROGRESS. This either happens after the first image of a Procedure Step was acquired or when the operator discontinues the Procedure Step.

The YSIO X.pree MPPS SCU uses the N-SET-RQ to inform the Information System about the finalization of the Procedure Step, using either a status of COMPLETED or DISCONTINUED. This happens when the examination workflow is explicitly closed or the operator explicitly discontinues the procedure step.

4.1.7 Functional Definition of Print AE

The SCU of the Print AE of YSIO X.pree is invoked by the user interface to setup film-sheet layout and whenever an image is ready to be printed on film. The Print SCU will hold and maintain all data needed to compile a complete film-sheet from the data (images, layout, configuration) received. Whenever a film-sheet is ready to print, the related data is used to supply the Information to the SOP Classes of the Print Management Service Class. A queue is maintained to intermediately store several film-sheets in case of resource problems on printer. The SCU will only supply and require the mandatory SOP Classes of the Print Management Service Class.

4.1.8 Functional Definition of Media AE

The YSIO X.pree Media AE provides the functionality to Import or Export DICOM Instances from and into the File System. During export, a DICOMDIR is generated. All SOP Classes marked accordingly in main column “Media Services” in Table 1.1-1 are supported for the Import/Export functionality.

Key features of the YSIO X.pree Media AE are:

- providing browsing windows for Import from and Export to the File System
- creating a new File-set into the File System (Export to ...)
- importing SOP Instances from the medium onto local Storage
- writing the File-sets DICOMDIR information into the file system

5 Service and Interoperability Description

5.1 Mapping of Services to Application Entities

Table 5.1-1 provides an overview of the Application Entities and the Services supported by each AE.

Table 5.1-1: Service to AE Mapping

Application Entity	Supported Services	Role				
		DIMSE		DICOM Media		
		SCU	SCP	FSC	FSU	FSR
Storage	Storage	Y	Y			
Storage Commitment	Storage Commitment	Y	Y			
Query/Retrieve	Query Retrieve	Y	Y			
Modality Worklist	Basic Worklist Management	Y	N			
Modality Performed Procedure Step	Modality Performed Procedure Step	Y	N			
Print	Print Management	Y	N			
Media				Y	Y	Y

5.2 Supported DIMSE Services

5.2.1 Basic Worklist Management Service

5.2.1.1 SCU of the Modality Worklist Information Model – FIND SOP Class

As a Service Class User of the Modality Worklist Information Model – FIND SOP Class, YSIO X.pree uses the C-FIND-RQ message to query the SCP. It supports the Query Keys listed in Table 5.2-1 which also enable “broad queries”.

In the “Matching Type” column, the following Values can be used:

- SINGLE_VALUE: SCU can request single Value matching on this Attribute.
- UID: SCU can request List of UID matching on this Attribute.
- WILDCARD: SCU can request Wildcard matching on this Attribute.
- RANGE: SCU can request Range matching on this Attribute.
- SEQUENCE: SCU can request sequence matching on this Attribute.
- UNIVERSAL: SCU can request Attribute as a return Value (universal matching).

In the “Query Value Source” column, the following Values can be used:

- FIXED: The query Value cannot be modified by the user or by configuration.
- GENERATED: The query Value is generated by the system (e.g. current date as the study date).
- CONFIG: The query Value is dependent on system configuration.
- USER: The query Value is entered by the user.
- SCANNED: The query Value is read from a barcode scanner or similar device.
- EMPTY: The query Value is left empty to indicate it is a return key only.

In the "Display on UI" column the following Values can be used:

- D: the return Value is displayed on the main UI by default.
- C: the return Value is displayed on the main UI if configured.
- N: the return Value is never displayed.

Table 5.2-1: Supported C-FIND Query Parameters for Modality Worklist - SCU

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Scheduled Procedure Step						
Schedule Procedure Step Sequence	(0040,0100)	SEQUENCE	GENERATED		N	
>Modality	(0008,0060)	SINGLE_VALUE, WILDCARD, FIXED	USER		Y	
>Scheduled Station AE Title	(0040,0001)	SINGLE_VALUE, WILDCARD	CONFIG		N	"Scheduled Station AE Title" is taken as default for "Performed Station AE Title"
>Scheduled Procedure Step Start Date	(0040,0002)	RANGE[1)]	USER		Y	
>Scheduled Procedure Step Start Time	(0040,0003)	UNIVERSAL	USER		Y	
>Scheduled Procedure Step End Date	(0040,0004)	UNIVERSAL	EMPTY		N	
>Scheduled Procedure Step End Time	(0040,0005)	UNIVERSAL	EMPTY		N	
>Scheduled Performing Physician's Name	(0040,0006)	SINGLE_VALUE, WILDCARD	CONFIG		Y	
>Scheduled Procedure Step Description	(0040,0007)	UNIVERSAL	EMPTY		Y	
>Scheduled Protocol Code Sequence	(0040,0008)	UNIVERSAL	EMPTY		N	
>Scheduled Procedure Step ID	(0040,0009)	UNIVERSAL	EMPTY		N	
>Scheduled Station Name	(0040,0010)	UNIVERSAL	EMPTY		N	
>Scheduled Procedure Step Location	(0040,0011)	SINGLE_VALUE, WILDCARD	CONFIG		N	
>Scheduled Procedure Step Status	(0040,0020)	SINGLE_VALUE	CONFIG		N	
>Scheduled Performing Physician's Name	(0040,0006)	UNIVERSAL	EMPTY		N	
>Comments on the Scheduled Procedure Step	(0040,0400)	UNIVERSAL	EMPTY		N	
Requested Procedure						
Study Date	(0008,0020)	UNIVERSAL	EMPTY		N	
Study Time	(0008,0030)	UNIVERSAL	EMPTY		N	
Referenced Study Sequence	(0008,1110)	UNIVERSAL	EMPTY		N	
>Referenced SOP Class UID	(0008,1150)	UNIVERSAL	EMPTY		N	
>Referenced SOP Instance UID	(0008,1155)	UNIVERSAL	EMPTY		N	
Study Instance UID	(0020,000D)	UNIVERSAL	EMPTY		N	
Requested Procedure Description	(0032,1060)	UNIVERSAL	EMPTY		Y	
Requested Procedure Code Sequence	(0032,1064)	UNIVERSAL	EMPTY		Y	
Requested Procedure ID	(0040,1001)	UNIVERSAL	EMPTY		Y	
Reason for the Requested Procedure	(0040,1002)	UNIVERSAL	EMPTY		N	

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Requested Procedure Priority	(0040,1003)	UNIVERSAL	EMPTY		N	
Patient Transport Arrangements	(0040,1004)	UNIVERSAL	EMPTY		N	
Confidentiality Code	(0040,1008)	UNIVERSAL	EMPTY		N	
Reporting Priority	(0040,1009)	UNIVERSAL	EMPTY		N	
Names of intended Recipients of Results	(0040,1010)	UNIVERSAL	EMPTY		N	
Requested Procedure Comments	(0040,1400)	UNIVERSAL	EMPTY		N	
Imaging Service Request						
Accession Number	(0008,0050)	UNIVERSAL	EMPTY		Y	
Referring Physician's Name	(0008,0090)	UNIVERSAL	EMPTY		Y	
Requesting Physician	(0032,1032)	UNIVESAL	EMPTY		Y	
Requesting Service	(0032,1033)	UNIVERSAL	EMPTY		N	
Issuing Date of Imaging Service Request	(0040,2004)	UNIVERSAL	EMPTY		N	
Issuing Time of Imaging Service Request	(0040,2005)	UNIVERSAL	EMPTY		N	
Placer Order Number / Imaging Service Request	(0040,2016)	UNIVERSAL	EMPTY		N	
Filler Order Number / Imaging Service Request	(0040,2017)	UNIVERSAL	EMPTY		N	
Order entered by ...	(0040,2008)	UNIVERSAL	EMPTY		N	
Order Enterer's location	(0040,2009)	UNIVERSAL	EMPTY		N	
Order Callback Phone Number	(0040,2010)	UNIVERSAL	EMPTY		N	
Imaging Service Request Comments	(0040,2400)	UNIVERSAL	EMPTY		N	
Visit Identification						
Admission ID	(0038,0010)	UNIVERSAL	EMPTY		N	
Issuer of Admission ID	(0038,0011)	UNIVERSAL	EMPTY		N	
Institution Name	(0008,0080)	UNIVERSAL	EMPTY		N	
Institution Address	(0008,0081)	UNIVERSAL	EMPTY		N	
Visit Status						
Current Patient Location	(0038,0300)	SINGLE_VALUE, WILDCARD	CONFIG		Y	
Visit Admission						
Admitting Diagnoses Description	(0008,1080)	UNIVERSAL	EMPTY		N	
Admitting Date	(0038,0020)	UNIVERSAL	EMPTY		N	
Patient Identification						
Patient's Name	(0010,0010)	UNIVERSAL	EMPTY		Y	
Patient ID	(0010,0020)	UNIVERSAL	EMPTY		Y	
Issuer of Patient ID	(0010,0021)	UNIVERSAL	EMPTY		N	
Other Patient IDs	(0010,1000)	UNIVERSAL	EMPTY		Y	
Other Patient Names	(0010,1001)	UNIVERSAL	EMPTY		Y	
Patient's Birth Name	(0010,1005)	UNIVERSAL	EMPTY		N	
Patient Demographics						
Patient's Birth Date	(0010,0030)	UNIVERSAL	EMPTY		Y	
Patient's Birth Time	(0010,0032)	UNIVERSAL	EMPTY		N	
Patient's Sex	(0010,0040)	UNIVERSAL	EMPTY		Y	
Patient's Insurance Plan Code Sequence	(0010,0050)	UNIVERSAL	EMPTY		N	

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Patient's Age	(0010,1010)	UNIVERSAL	EMPTY		Y	
Patient's Size	(0010,1020)	UNIVERSAL	EMPTY		Y	
Patient's Weight	(0010,1030)	UNIVERSAL	EMPTY		Y	
Patient's Address	(0010,1040)	UNIVERSAL	EMPTY		N	
Military Rank	(0010,1080)	UNIVERSAL	EMPTY		Y	
Branch of Service	(0010,1081)	UNIVERSAL	EMPTY		N	
Ethnic Group	(0010,2160)	UNIVERSAL	EMPTY		Y	
Patient Comments	(0010,4000)	UNIVERSAL	EMPTY		Y	
Patient Medical						
Medical Alerts	(0010,2000)	UNIVERSAL	EMPTY		Y	
Allergies	(0010,2110)	UNIVERSAL	EMPTY		Y	
Pregnancy Status	(0010,21C0)	UNIVERSAL	EMPTY		Y	
Smoking Status	(0010,21A0)	UNIVERSAL	EMPTY		N	
Last Menstrual Date	(0010,21D0)	UNIVERSAL	EMPTY		N	
Additional Patient History	(0010,21B0)	UNIVERSAL	EMPTY		N	
Special Needs	(0038,0050)	UNIVERSAL	EMPTY		N	

[1)] A time window can be configured by defining how many days to look into the past and into the future (Ad-ministration Portal-> Technical Configuration->DICOM Nodes->Local DICOM Node->Worklist)

The User can cancel any running Query. In this case C-CANCEL-RQ will be sent to the SCP. The processing of the data, which are received in the respective Association is stopped. The Association is closed if a Confirmation for the Cancelling is received as C-FIND-RSP, Status Cancelled, or if the Confirmation does not arrive in the Transfer Inactivity Timeout (see Table 6.1-1).

An automatic Modality Worklist Query can be configured from the Administration Portal.

5.2.1.2 SCP of the Modality Worklist Information Model – FIND SOP Class

N/A

5.2.2 Modality Performed Procedure Step Service

5.2.2.1 SCU of the Modality Performed Procedure Step SOP Class

As a Service Class User of the Modality Performed Procedure Step SOP Class, YSIO X.pree supports the Attributes listed in Table 5.2-2 in the N-CREATE-RQ and N-SET-RQ messages, if it creates the message.

The same information is sent to all configured remote MPPS nodes.

In the "Source" column the following Values can be used:

- FIXED: the Value is pre-defined and cannot be modified.
- GENERATED: the Value is generated by the system.
- CONFIGURATION: the Value is copied from system configuration.
- MWL: the Value is copied from modality worklist entry.
- USER: the Value is entered by the user.
- SCANNED: the Value is read from a barcode scanner or similar device.
- EMPTY: the Attribute is sent without Value.

Table 5.2-2: Supported N-CREATE and N-SET Attributes for Modality Performed Procedure Step - SCU

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
Specific Character Set	(0008,0005)	FIXED	Only set, if characters outside ISO-IR 6 are used.	Only set, if characters outside ISO-IR 6 are used.	
Patient's Name	(0010,0010)	MWL, USER	Patient's Name	Not contained.	
Patient ID	(0010,0020)	MWL, USER, GENERATED	Patient ID	Not contained.	
Issuer of Patient ID	(0010,0021)	MWL	Issuer of Patient ID	Not contained.	
Patient's Birth Date	(0010,0030)		Patient's Birth Date	Not contained.	
Patient's Sex	(0010,0040)		Patient's Sex	Not contained.	
Scheduled Step Attributes Sequence	(0040,0270)		In case of RIS registered patient the information from Modality Worklist item is taken, otherwise (local registration) a single item is added that only contains the Study Instance UID. Other attributes are empty.	Not contained.	
>Study Instance UID	(0020,000D)		In case of RIS registered patient, the information from Modality Worklist item is taken, otherwise (locally registered): a new Study Instance UID is generated.	Not contained.	
>Referenced Study Sequence	(0008,1110)		In case of RIS registered patient, the information from Modality Worklist item is taken, otherwise (locally registered): empty	Not contained.	
>>Referenced SOP Class UID	(0008,1150)		The referenced SOP Class UID from (0008,1110).	Not contained.	
>>Referenced SOP Instance UID	(0008,1155)		The referenced SOP Instance UID from (0008,1110).	Not contained.	
>Accession Number	(0008,0050)	MWL, USER, EMPTY	Accession Number taken from RIS Modality Worklist or empty in case of locally registered patient.	Not contained.	
>Requested Procedure ID	(0040,1001)		Requested Procedure ID taken from RIS Modality Worklist or empty in case of locally registered patient.	Not contained.	
>Requested Procedure Description	(0032,1060)		Requested Procedure Description taken from RIS Modality Worklist or empty in case of locally registered patient.	Not contained.	
>Scheduled Procedure Step ID	(0040,0009)		In case of RIS registered patient, the information from Modality Worklist item is taken, otherwise (locally registered): empty	Not contained.	
>Scheduled Procedure Step Description	(0040,0007)		In case of RIS registered patient, the information from Modality Worklist item is taken, otherwise (locally registered): empty	Not contained.	
>Scheduled Protocol Code Sequence	(0040,0008)		In case of RIS registered patient, the information from Modality Worklist item is taken, otherwise (locally registered): empty	Not contained.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>>Code Value	(0008,0100)		Code Value from (0040,0008)	Not contained.	
>>Coding Scheme Designator	(0008,0102)		Coding Scheme Designator from (0040,0008)	Not contained.	
>>Code Meaning	(0008,0104)		Code Meaning from (0040,0008)	Not contained.	
Performed Station AE Title	(0040,0241)		The configured AET of MPPS SCU.	Not contained.	
Performed Station Name	(0040,0242)		"Ward" from AdminPortal ("Site Information" / "Customer")	Not contained.	
Performed Location	(0040,0243)		"Department" from AdminPortal ("Site Information" / "Customer")	Not contained.	
Performed Procedure Step Start Date	(0040,0244)		Date when the first acquisition for the CP took place.	Not contained.	
Performed Procedure Step Start Time	(0040,0245)		Time when the first acquisition for the CP took place.	Not contained.	
Performed Procedure Step ID	(0040,0253)		Internally generated	Not contained.	
Performed Procedure Step End Date	(0040,0250)		Empty	The date the procedure step (exam for the CP) was closed. Only sent in final N-SET (COMPLETED or DISCONTINUED).	
Performed Procedure Step End Time	(0040,0251)		Empty	The time the procedure step (exam for the CP) was closed. Only sent in final N-SET (COMPLETED or DISCONTINUED).	
Performed Procedure Step Status	(0040,0252)		IN PROGRESS	IN PROGRESS: if the CP is not yet finished COMPLETED: if at least one CP Step of the SPS was done and the examination workflow closed. DISCONTINUED: if the CP was cancelled	
Performed Procedure Step Description	(0040,0254)		CP name.	CP name.	
Procedure Code Sequence	(0008,1032)		In case the procedure was executed as scheduled in RIS, the Requested Procedure Code (0032,1064) from Modality Worklist is copied Otherwise (locally registered, different): empty	In case the procedure was executed as scheduled in RIS, the Requested Procedure Code (0032,1064) from Modality Worklist is copied Otherwise (locally registered, different): empty	
>Code Value	(0008,0100)		Code Value from (0008,1032)	Code Value from (0008,1032)	
>Coding Scheme Designator	(0008,0102)		Coding Scheme Designator from (0008,1032)	Coding Scheme Designator from (0008,1032)	
>Code Meaning	(0008,0104)		Code Meaning from (0008,1032)	Code Meaning from (0008,1032)	
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)		Empty.	Contains the reason the user selected in UI in case the PPS was cancelled. See CID 9300 “Procedure Discontinuation Reasons”.	
>Code Value	(0008,0100)		Code Value from (0040,0281)	Code Value from (0040,0281)	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Coding Scheme Designator	(0008,0102)		Coding Scheme Designator from (0040,0281)	Coding Scheme Designator from (0040,0281)	
>Coding Scheme Version	(0008,0103)		Coding Scheme Version from (0040,0281)	Coding Scheme Version from (0040,0281)	
>Code Meaning	(0008,0104)		Code Meaning from (0040,0281)	Code Meaning from (0040,0281)	
Modality	(0008,0060)		"DX"	Not contained.	
Study ID	(0020,0010)		Copy of the Requested Procedure ID from Worklist request	Not contained.	
Performed Protocol Code Sequence	(0040,0260)		Always empty.	Always empty.	
Performed Series Sequence	(0040,0340)		Always contains the images (processed and unprocessed) and Dose Report that were already created for this PPS, even in case of rejection/deletion.	Always contains the images (processed and unprocessed) and Dose Report that were already created for this PPS, even in case of rejection/deletion.	
>Performing Physician's Name	(0008,1050)		Performing Physician's Name either entered/changed by the user or taken from RIS Modality Worklist (Prefilled with "Scheduled Performing Physician's Name").	Performing Physician's Name either entered/changed by the user or taken from RIS Modality Worklist (Prefilled with "Scheduled Performing Physician's Name").	
>Operators' Name	(0008,1070)		Value as entered during patient registration. Prefilled with login name of current user.	Value as entered during patient registration. Prefilled with login name of current user.	
>Protocol Name	(0018,1030)		Name of CP Step in case of images. For Dose Report: "Radiation Dose Information"	Name of CP Step in case of images. For Dose Report: "Radiation Dose Information"	
>Series Instance UID	(0020,000E)		Internally generated.	Internally generated.	
>Series Description	(0008,103E)		Name of CP Step in case of images. For Dose Report: "Radiation Dose Information"	Name of CP Step in case of images. For Dose Report: "Radiation Dose Information"	
>Retrieve AE Title	(0008,0054)		Empty	Empty	
>Referenced Image Sequence	(0008,1140)		Contains all images that were acquired until the current point in time. This includes also deleted/rejected images and unprocessed images.	Contains all images that were acquired until the current point in time. This includes also deleted/rejected images and unprocessed images.	
>>Referenced SOP Class UID	(0008,1150)		The Referenced SOP Class UID from (0008,1140)	The Referenced SOP Class UID from (0008,1140)	
>>Referenced SOP Instance UID	(0008,1155)		The Referenced Instance Class UID from (0008,1140)	The Referenced Instance Class UID from (0008,1140)	
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)		Not contained.	See "Referenced Image Sequence", but here only NON-image objects are contained (e.g. Dose Reports).	
>>Referenced SOP Class UID	(0008,1150)		The Referenced SOP Class UID from (0040,0220)	The Referenced SOP Class UID from (0040,0220)	
>>Referenced SOP Instance UID	(0008,1155)		The Referenced Instance Class UID from (0040,0220)	The Referenced Instance Class UID from (0040,0220)	
Anatomic Structure, Space or Region Sequence	(0008,2229)		Empty.	Please refer to EV (123014,DCM, "Target Region") in Dose Report.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Code Value	(0008,0100)		Not contained.	Code Value from (0008,2229)	
>Coding Scheme Designator	(0008,0102)		Not contained.	Coding Scheme Designator from (0008,2229)	
>Code Meaning	(0008,0104)		Not contained.	Code Meaning from (0008,2229)	
Total Time of Fluoroscopy	(0040,0300)		Empty	0	
Total Number of Exposures	(0040,0301)		Empty.	The total number of exposures for all images referenced in this MPPS (also in case of DISCONTINUED).	
Distance Source to Detector	(0018,1110)		Empty	Set, if it is the same for all acquisitions, otherwise empty.	
Entrance Dose	(0040,0302)		see N-SET	Sum of the entrance dose for all irradiation events for the procedure step already executed. Same as skin dose/air kerma/Dose at RP. Measured in dGy. Only available, if SID and SOD are known.	
Entrance Dose in mGy	(0040,8302)		see N-SET	See Entrance Dose.	
Image and Fluoroscopy Area Dose Product	(0018,115E)		Empty	The total area-dose-product for all images referenced in this procedure step (also in case of DISCONTINUED). Also includes cassette images and rejected images.	
Comments on Radiation Dose	(0040,0310)		Empty	Formatted dose information. The following information is included: - Name of Clinical Protocol Step - DAP - kV - mAs - Filter Thickness in mm - EXI The information for all images referenced in this MPPS (also in case of DISCONTINUED). Also includes cassette images and rejected images.	
Exposure Dose Sequence	(0040,030E)		Empty	One item for each acquisition / irradiation event.	
>Radiation Mode	(0018,115A)		Not contained.	"PULSED"	
>KVP	(0018,0060)		Not contained.	Peak kilo voltage output of the X-Ray generator used.	
>X-Ray Tube Current in µA	(0018,8151)		Not contained.	X-Ray Tube Current in µA.	
>Exposure Time	(0018,1150)		Not contained.	Duration of X-Ray exposure in msec	
>Filter Type	(0018,1160)		Not contained.	FLAT in case COPPER filter is used, otherwise NONE	
>Filter Material	(0018,7050)		Not contained.	COPPER (empty if no copper filter used)	
>Comments on Radiation Dose	(0040,0310)		Not contained.	See "Comments on Radiation Dose", but here only for a single irradiation event.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Entrance Dose in mGy	(0040,8302)		Not contained.	Entrance dose for this irradiation event. Same as skin dose/air kerma/Dose at RP.	
>Distance Source to Detector	(0018,1110)		Not contained.	Distance in mm from source to detector center. Also known as SID (Source Image Distance) Only set in case it is known, otherwise empty.	
>Image and Fluoroscopy Area Dose Product	(0018,115E)		Not contained.	DAP in dGy cm^2 in case a DAP chamber is present, otherwise empty	
>Protocol Name	(0018,1030)		Not contained.	Name of CP Step.	
>Relative X-Ray Exposure	(0018,1405)		Not contained.	Physical EXI	

YSIO X.pree sends the N-CREATE when the first image of a procedure step was acquired and N-SET is sent when the study is closed.

5.2.2.2 SCP of the Modality Performed Procedure Step SOP Class

N/A

5.2.3 Storage Service

5.2.3.1 SCU of the Storage SOP Classes

As a Service Class User of the Storage Service Class, YSIO X.pree uses the C-STORE-RQ message to request storage of DICOM objects by a remote SCP. See section 1.1 in the Overview for the list of supported SOP Classes.

For details regarding the content of SOP Instances that are created by the system, see Annex A, which describes the underlying IOD of the supported SOP Classes.

5.2.3.1.1 Proposed Presentation Contexts

YSIO X.pree proposes one Presentation Context for each SOP Class/Transfer Syntax combination in the A-ASSOCIATE-RQ. The number of Presentation Contexts in an A-ASSOCIATE-RQ message is limited to 128. If this limit is exceeded, multiple Transfer Syntaxes are offered in one presentation context.

For all Image Objects listed in Table 1.1-1: Storage SOP Classes, which have "C" in the Transfer Syntax Column, all the corresponding Transfer Syntaxes from

Table 1.1-2: Supported Transfer **Syntaxes** are proposed in a Presentation Context.

For all Non-Image Objects listed in Table 1, which have "U" in the Transfer Syntax column, all the corresponding Transfer Syntaxes from

Table 1.1-2: Supported Transfer **Syntaxes** are proposed in a Presentation Context.

For a distinction between Image and Non-Image Objects please refer to the DICOM Standard PS3.3 Section A.1.4 "Overview of the Composite IOD Module Content [1]"

If multiple Transfer Syntaxes are accepted by the remote node (SCP) for a SOP Class, YSIO X.pree will select a compressed or uncompressed Transfer Syntax among them depending on the configuration. The Transfer Syntax chosen is the preferred one among the compressed and uncompressed ones. The preference order is the order of occurrence in the configuration. The configuration can even be extended, based on the combination of SOP Classes and supported Transfer Syntaxes.

All DICOM objects that YSIO X.pree creates are stored in a separate series except the original projections of an Ortho acquisition that are stored in the same series. The composed image of the ortho acquisition is always stored in a separate series.

5.2.3.1.2 Transcoding of Transfer Syntaxes

Table 5.2-3: Transcoding of Transfer Syntaxes describes supported transcodings between the locally stored encoding of SOP Instances and the negotiated Transfer Syntax. The following Values can be used:

- SUPPORTED: Transcoding is possible and same SOP Instance UID is re-used.
- NEW_UID: Transcoding is possible; however a new SOP Instance is created for transfer, e.g. due to lossy compression.
- NOT_SUPPORTED: Transcoding is not possible.

Table 5.2-3: Transcoding of Transfer Syntaxes

Sent Transfer Syntax / Stored Transfer Syntax	Implicit VR Little Endian	Explicit VR Little Endian	Explicit VR Big Endian	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14)	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14)	JPEG 2000 Image Compression (Lossless Only)	RLE Lossless	JPEG Extended (Process 2 & 4)	JPEG Baseline (Process 1)	JPEG 2000 Image Compression
Implicit VR Little Endian		NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID
Explicit VR Little Endian	NEW_UID		SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED
Explicit VR Big Endian	NEW_UID	SUPPORTED		SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14)	NEW_UID	SUPPORTED	SUPPORTED		SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED
JPEG Lossless, Non-Hierarchical (Processes 14)	NEW_UID	SUPPORTED	SUPPORTED	SUPPORTED		SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED
JPEG 2000 Image Compression (Lossless Only)	NEW_UID	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED		SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED
RLE Lossless	NEW_UID	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED	SUPPORTED		SUPPORTED	SUPPORTED	SUPPORTED
JPEG Extended (Process 2 & 4)	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID		NOT_SUPPORTED[1)]	NEW_UID
JPEG Baseline (Process 1)	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NOT_SUPPORTED[1)]		NEW_UID
JPEG 2000 Image Compression	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	NEW_UID	SUPPORTED	

1) JPEG Baseline (Process 1) is made for 8 Bit images, JPEG Extended (Process 2 & 4) is made for 12 Bit images. Since the same image cannot be 8 Bit and 12 Bit, the two compression algorithms are not compatible. As such,

not every image undergoes every kind of transcoding. Using only lossy compression may result in incorrect diagnosis due to insufficient image quality.

Every transcoding is noted in the DICOM Data in the Tags (0008,2111) Derivation Description and (0008,2112) Source Image Sequence.

5.2.3.2 SCP of the Storage SOP Classes

As a Service Class Provider of the Storage Service Class, YSIO X.pree receives the C-STORE-RQ message from remote SCUs. See section 1.1 in the Overview for the list of supported SOP Classes.

5.2.3.2.1 Accepted Presentation Contexts

When receiving an association request from a remote node, YSIO X.pree accepts all presentation context containing a transfer syntax configured for that node. If multiple transfer syntaxes are proposed within one presentation context, YSIO X.pree selects it based on the configured preference order configured for that node. The preference order is the order of occurrence of the transfer syntaxes in the configuration. For each node it is possible to select Transfer Syntaxes, that can be used, and Transfer Syntaxes, that are excluded. The configuration can even be extended, based on the combination of SOP Classes and supported Transfer Syntaxes.

Table 1.1-1: Storage SOP Classes and

Table 1.1-2: Supported Transfer Syntaxes lists all Transfer Syntaxes that are supported for the Transfer Objects.

Generally, all Presentation Contexts are accepted if they contain at least one suitable Transfer Syntax. All other Presentation Contexts are rejected.

5.2.3.2.2 Details of Conformance

Table 5.2-4 defines the conformance levels of YSIO X.pree

Table 5.2-4: Levels of Conformance

Levels of Conformance	2[1)]
Level of Digital Signature Support	N/A

[1)] The level of Conformance is by default 2, however the user has the possibility to configure Header Correction Rulesets, which contains deletion. If such a Header Correction Ruleset is selected, the Level of Conformance is 0 (Local).

Table 5.2-5 lists actions performed upon receiving instances from a remote AE and system behavior when certain conditions are encountered.

Table 5.2-5: Behavior when storing Instances

Action upon Receiving	Condition	System behavior
Perform Attribute Validation	Minor DICOM inconsistencies	Incorrect characters are replaced with "?"
	Duplicate Instance	The new Instances are ignored. The sender receives the DIMSE Code Duplicate SOP Instance (0111) as an instance response only if the duplicate Instances are received in the same Association. If Late Response[1)] option is set (a response is only sent, after all the instances are stored in the persistent storage), this code is sent as soon as the duplication is detected (during indexing). The processing continues with the next instance.
	DICOM Validation error	Returns the DIMSE error code 0110 in the response. The processing continues with the next instance.
	Success	Instances are stored in internal database
Add to an existing study	Mismatch in patient identifying information detected	No exception queue is supported. In case of a PII match, the newly received data will be added to the respective patient, otherwise a new patient will be created.

Action upon Receiving	Condition	System behavior
	Success	Instances are stored in local database
Localize Patient Information	Patient mismatch detected	A new patient is created.
	Success	Original patient identity information is copied to Other Patient ID Sequence (0010,1002). Instances are stored in internal database.
Coerce non-patient-identifying Attributes	Success	Original Values of coerced Attributes are copied to Original Attributes Sequence (0040,0561). Instances are stored in local database

[1)] In an Early Response scenario, the C-STORE-RSP is sent immediately. In a Late Response scenario the C-STORE-RSP is sent after the received instance is stored in the persistent storage.

A compression can be enforced by storing instances by Transfer Syntax exclusion on the Administration Portal.

5.2.3.3 Attribute Coercion

It is possible to configure Attribute Coercion for the Remote DICOM Nodes, both for SCU (Attribute Coercion for the data received from the *remote SCU*) and SCP (Attribute Coercion before sending the data to the *remote SCP*) side.

YSIO X.pree offers the user an extendable list of Header Correction Rulesets. The very same set can be applied on the SCP and SCU Side.

Header Correction Ruleset can be added, removed and changed. They are file based and can be changed. No re-installation is required.

Beside the corrections that needs to be done, pre-conditions can be defined for the operations performed on attributes.

The “SOP Class UID” column indicates whether the coercion is applicable to specific SOP Classes or to “ALL” SOP Classes. YSIO X.pree only provides correction rules for ALL SOP Classes. A restriction to specific SOP Classes is not supported.

The “Type of Change” column defines the coercion done to the Attributes, the following Values can be used:

- MODIFIED: The Value of the Attribute is changed; the new Value is described in the “New Value” column.
- ADDED: The Attribute is added with the Value defined in the “New Value” column.
- REMOVED: That Attribute is completely removed from the instance.

The “Condition” column defines the condition under which coercion is performed. The following Values can be used:

- ALWAYS: Data coercion is performed on each instance of the specified SOP Class that is sent or received by the system.
- EXTERNAL: Data coercion is performed on instances sent to or received from systems external to the institution.
- CONFIGURATION: Data coercion is performed based on system configuration.
- OTHER: Data coercion is performed for other conditions. Details are defined in the “Comments” column.

Table 5.2-6,
Table 5.2-7,
Table 5.2-8,
Table 5.2-9,
Table 5.2-10 and
Table 5.2-11 describe the standard set of the Header Correction Rules provided.

The names of the Header Correction Sets, included between quotation marks, is the name the Service User can select by configuring the Storage Service behavior for Remote DICOM Nodes.

By default no Header Correction Rule Set is applied. The selection of the applicable Header Correction Rule Set is performed by the user. Not all Rule Sets should be applied to all kinds of data. This Document provides a detailed

description of the capabilities and features of each Header Correction Rule Set. It is the responsibility of the Service User to apply the correct one for the respective operation.

Different Header Correction Rule Sets may handle the same Tag in different ways.

The Service User can select one or more Header Correction Rule Sets to be applied to the data transferred. In this case they are applied sequentially, in alphabetical order of their name.

The syntagm "Standard" in, for example, "Standard Header Correction Ruleset" means, that this is something, that is delivered with the product. The Service User can create and apply additional Header Correction Rulesets. All Header Correction Rules described below are delivered with the product.

Table 5.2-6: Standard Header Correction Set *"Handle Acquisition Time"*

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Acquisition Time	(0008,0032)	ALL	ADDED, MODIFIED	Current Data and Time	OTHER	Added, if the Attribute is missing. Modified, if the Attribute does not have any value.

Table 5.2-7: Standard Header Correction Set *"Handle Patient's Age"*

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Patient's Age	(0010,1010)	ALL	MODIFIED	Normalized Age String	ALWAYS	

Table 5.2-8: Standard Header Correction Set *"Handle Patient's Sex"*

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Patient's Sex	(0010,0040)	ALL	MODIFIED	The values expected by the DICOM Standard	OTHER	This is configured to replace standard values written in small case or to replace nonstandard values (such as w or W for female in German).

Table 5.2-9: Standard Header Correction Set *"Handle Patient's Weight and Size"*

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Patient's Size	(0010,1020)	ALL	REMOVED		OTHER	The Attribute is removed if its value is 0 with a tolerance of +/- 0.1 (invalid value).
Patient's Weight	(0010,1030)	ALL	REMOVED		OTHER	The Attribute is removed if its value is 0 with a tolerance of +/- 0.1 (invalid value).

Table 5.2-10: Standard Header Correction Set *"Remove All Private Data Elements (Tag Based)"*

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Instance Coercion DateTime	(0008,0015)	ALL	REMOVED		ALWAYS	
Study Date	(0008,0020)	ALL	MODIFY	Current Date	ALWAYS	

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Series Date	(0008,0021)	ALL	MODIFY	Current Date	ALWAYS	
Acquisition Date	(0008,0022)	ALL	MODIFY	Current Date	ALWAYS	
Content Date	(0008,0023)	ALL	MODIFY	Current Date	ALWAYS	
Overlay Date	(0008,0024)	ALL	REMOVED		ALWAYS	This Tag is retired
Curve Date	(0008,0025)	ALL	REMOVED		ALWAYS	This Tag is retired
Acquisition DateTime	(0008,002A)	ALL	MODIFY	Current Date and Time	ALWAYS	
Study Time	(0008,0030)	ALL	MODIFY	Current Time	ALWAYS	
Acquisition Time	(0008,0032)	ALL	MODIFY	Current Time	ALWAYS	
Content Time	(0008,0033)	ALL	MODIFY	Current Time	ALWAYS	
Overlay Time	(0008,0034)	ALL	REMOVED		ALWAYS	This Tag is retired
Curve Time	(0008,0035)	ALL	REMOVED		ALWAYS	This Tag is retired
Accession Number	(0008,0050)	ALL	MODIFY	Empty Value	OTHER	If the Tag has a value
Institution Name	(0008,0080)	ALL	MODIFY	Empty Value	OTHER	If the Tag has a value
Institution Address	(0008,0081)	ALL	REMOVED		ALWAYS	
Institution Code Sequence	(0008,0082)	ALL	REMOVED		ALWAYS	
Referring Physician's Name	(0008,0090)	ALL	MODIFY	Empty Value	If the Tag has a value	
Referring Physician's Address	(0008,0092)	ALL	REMOVED		ALWAYS	
Referring Physician's Telephone Numbers	(0008,0094)	ALL	REMOVED		ALWAYS	
Referring Physician Identification Sequence	(0008,0096)	ALL	REMOVED		ALWAYS	
Timezone Offset From UTC	(0008,0201)	ALL	REMOVED		ALWAYS	
Study Description	(0008,1030)	ALL	REMOVED		ALWAYS	
Series Description	(0008,103E)	ALL	REMOVED		ALWAYS	
Institutional Department Name	(0008,1040)	ALL	REMOVED		ALWAYS	
Physician(s) of Record	(0008,1048)	ALL	REMOVED		ALWAYS	
Physician(s) of Record Identification Sequence	(0008,1049)	ALL	REMOVED		ALWAYS	
Performing Physician's Name	(0008,1050)	ALL	REMOVED		ALWAYS	
Performing Physician Identification Sequence	(0008,1052)	ALL	REMOVED		ALWAYS	
Name of Physician(s) Reading Study	(0008,1060)	ALL	REMOVED		ALWAYS	
Physician(s) Reading Study Identification Sequence	(0008,1062)	ALL	REMOVED		ALWAYS	
Operators' Name	(0008,1070)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a value
Operator Identification Sequence	(0008,1072)	ALL	REMOVED		ALWAYS	
Admitting Diagnoses Description	(0008,1080)	ALL	REMOVED		ALWAYS	
Admitting Diagnoses Code Sequence	(0008,1084)	ALL	REMOVED		ALWAYS	

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Referenced Study Sequence	(0008,1110)	ALL	REMOVED		ALWAYS	
Referenced Performed Procedure Step Sequence	(0008,1111)	ALL	REMOVED		ALWAYS	
Referenced Patient Sequence	(0008,1120)	ALL	REMOVED		ALWAYS	
Referenced Image Sequence	(0008,1140)	ALL	REMOVED		ALWAYS	
Derivation Description	(0008,2111)	ALL	REMOVED		ALWAYS	
Source Image Sequence	(0008,2112)	ALL	REMOVED		ALWAYS	
Identifying Comments	(0008,4000)	ALL	REMOVED		ALWAYS	This Tag is retired
Patient's Name	(0010,0010)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a value
Patient ID	(0010,0020)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a value
Issuer of Patient ID	(0010,0021)	ALL	REMOVED		ALWAYS	
Patient's Birth Date	(0010,0030)	ALL	MODIFIED	The current Date	ALWAYS	
Patient's Sex	(0010,0040)	ALL	MODIFIED	O	OTHER	If the Tag has a value
Patient's Insurance Plan Code Sequence	(0010,0050)	ALL	REMOVED		ALWAYS	
Patient's Primary Language Code Sequence	(0010,0101)	ALL	REMOVED		ALWAYS	
Patient's Primary Language Modifier Code Sequence	(0010,0102)	ALL	REMOVED		ALWAYS	
Other Patient IDs	(0010,1000)	ALL	REMOVED		ALWAYS	This Tag is retired
Other Patient Names	(0010,1001)	ALL	REMOVED		ALWAYS	
Other Patient IDs Sequence	(0010,1002)	ALL	REMOVED		ALWAYS	
Patient's Birth Name	(0010,1005)	ALL	REMOVED		ALWAYS	
Patient's Age	(0010,1010)	ALL	REMOVED		ALWAYS	
Patient's Size	(0010,1020)	ALL	REMOVED		ALWAYS	
Patient's Weight	(0010,1030)	ALL	REMOVED		ALWAYS	
Patient's Address	(0010,1040)	ALL	REMOVED		ALWAYS	
Insurance Plan Identification	(0010,1050)	ALL	REMOVED		ALWAYS	
Patient's Mother's Birth Name	(0010,1060)	ALL	REMOVED		ALWAYS	
Military Rank	(0010,1080)	ALL	REMOVED		ALWAYS	
Branch of Service	(0010,1081)	ALL	REMOVED		ALWAYS	
Medical Record Locator	(0010,1090)	ALL	REMOVED		ALWAYS	This Tag is retired
Referenced Patient Photo Sequence	(0010,1100)	ALL	REMOVED		ALWAYS	
Medical Alerts	(0010,2000)	ALL	REMOVED		ALWAYS	
Allergies	(0010,2110)	ALL	REMOVED		ALWAYS	
Country of Residence	(0010,2150)	ALL	REMOVED		ALWAYS	
Region of Residence	(0010,2152)	ALL	REMOVED		ALWAYS	
Patient's Telephone Numbers	(0010,2154)	ALL	REMOVED		ALWAYS	

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Ethnic Group	(0010,2160)	ALL	REMOVED		ALWAYS	
Occupation	(0010,2180)	ALL	REMOVED		ALWAYS	
Smoking Status	(0010,21A0)	ALL	REMOVED		ALWAYS	
Additional Patient History	(0010,21B0)	ALL	REMOVED		ALWAYS	
Pregnancy Status	(0010,21C0)	ALL	REMOVED		ALWAYS	
Last Menstrual Date	(0010,21D0)	ALL	REMOVED		ALWAYS	
Patient's Religious Preference	(0010,21F0)	ALL	REMOVED		ALWAYS	
Patient's Sex Neutered	(0010,2203)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value
Responsible Person	(0010,2297)	ALL	REMOVED		ALWAYS	
Responsible Organization	(0010,2299)	ALL	REMOVED		ALWAYS	
Patient Comments	(0010,4000)	ALL	REMOVED		ALWAYS	
Patient Identity Removed	(0012,0062)	ALL	MODIFIED	YES	ALWAYS	
De-identification Method	(0012,0063)	ALL	ADDED	Deidentified\Basic Application Confidentiality Profile applied	ALWAYS	
De-identification Method Code Sequence	(0012,0064)	ALL	ADDED	(0008,0100) set to 113100 (0008,0102) set to DCM (0008,0104) set to Basic Application Confidentiality Profile	ALWAYS	
Contrast/Bolus Agent	(0018,0010)	ALL	MODIFIED	De-identified	OTHER	If the Tag has a Value
Device Serial Number	(0018,1000)	ALL	MODIFIED	De-identified	OTHER	If the Tag has a Value
Plate ID	(0018,1004)	ALL	REMOVED		ALWAYS	
Generator ID	(0018,1005)	ALL	REMOVED		ALWAYS	
Cassette ID	(0018,1007)	ALL	REMOVED		ALWAYS	
Gantry ID	(0018,1008)	ALL	REMOVED		ALWAYS	
Protocol Name	(0018,1030)	ALL	MODIFIED	De-identified	OTHER	If the Tag has a Value
Acquisition Device Processing Description	(0018,1400)	ALL	MODIFIED	De-identified	OTHER	If the Tag has a Value
Acquisition Comments	(0018,4000)	ALL	REMOVED		ALWAYS	This Tag is retired
Detector ID	(0018,700A)	ALL	MODIFIED	Deidentified	OTHER	If the Tag has a Value
Acquisition Protocol Description	(0018,9424)	ALL	REMOVED		ALWAYS	
Start Acquisition DateTime	(0018,9516)	ALL	MODIFY	Current Date and Time	ALWAYS	
End Acquisition DateTime	(0018,9517)	ALL	MODIFY	Current Date and Time	ALWAYS	
Contribution Description	(0018,A003)	ALL	REMOVED		ALWAYS	
Study ID	(0020,0010)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value
Modifying Device ID	(0020,3401)	ALL	REMOVED		ALWAYS	This Tag is retired
Modifying Device Manufacturer	(0020,3404)	ALL	REMOVED		ALWAYS	This Tag is retired

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Modified Image Description	(0020,3406)	ALL	REMOVED			This Tag is retired
Image Comments	(0020,4000)	ALL	REMOVED		ALWAYS	
Frame Comments	(0020,9158)	ALL	REMOVED		ALWAYS	
Image Presentation Comments	(0028,4000)	ALL	REMOVED		ALWAYS	This Tag is retired
Study ID Issuer	(0032,0012)	ALL	REMOVED		ALWAYS	This Tag is retired
Scheduled Study Location	(0032,1020)	ALL	REMOVED		ALWAYS	This Tag is retired
Scheduled Study Location AE Title	(0032,1021)	ALL	REMOVED		ALWAYS	This Tag is retired
Reason for Study	(0032,1030)	ALL	REMOVED		ALWAYS	This Tag is retired
Requesting Physician	(0032,1032)	ALL	REMOVED		ALWAYS	
Requesting Service	(0032,1033)	ALL	REMOVED		ALWAYS	
Requested Procedure Description	(0032,1060)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value
Requested Contrast Agent	(0032,1070)	ALL	REMOVED		ALWAYS	
Study Comments	(0032,4000)	ALL	REMOVED		ALWAYS	This Tag is retired
Referenced Patient Alias Sequence	(0038,0004)	ALL	REMOVED		ALWAYS	
Admission ID	(0038,0010)	ALL	REMOVED		ALWAYS	
Issuer of Admission ID	(0038,0011)	ALL	REMOVED		ALWAYS	This Tag is retired
Scheduled Patient Institution Residence	(0038,001E)	ALL	REMOVED		ALWAYS	This Tag is retired
Admitting Date	(0038,0020)	ALL	REMOVED		ALWAYS	
Admitting Time	(0038,0021)	ALL	REMOVED		ALWAYS	
Discharge Diagnosis Description	(0038,0040)	ALL	REMOVED		ALWAYS	This Tag is retired
Special Needs	(0038,0050)	ALL	REMOVED		ALWAYS	
Service Episode ID	(0038,0060)	ALL	REMOVED		ALWAYS	
Issuer of Service Episode ID	(0038,0061)	ALL	REMOVED		ALWAYS	This Tag is retired
Service Episode Description	(0038,0062)	ALL	REMOVED		ALWAYS	
Current Patient Location	(0038,0300)	ALL	REMOVED		ALWAYS	
Patient's Institution Residence	(0038,0400)	ALL	REMOVED		ALWAYS	
Patient State	(0038,0500)	ALL	REMOVED		ALWAYS	
Visit Comments	(0038,4000)	ALL	REMOVED		ALWAYS	
Scheduled Station AE Title	(0040,0001)	ALL	REMOVED		ALWAYS	
Scheduled Procedure Step Start Date	(0040,0002)	ALL	REMOVED		ALWAYS	
Scheduled Procedure Step Start Time	(0040,0003)	ALL	REMOVED		ALWAYS	
Scheduled Procedure Step End Date	(0040,0004)	ALL	REMOVED		ALWAYS	
Scheduled Procedure Step End Time	(0040,0005)	ALL	REMOVED		ALWAYS	
Scheduled Performing Physician's Name	(0040,0006)	ALL	REMOVED		ALWAYS	

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Scheduled Procedure Step Description	(0040,0007)	ALL	REMOVED		ALWAYS	
Scheduled Performing Physician Identification Sequence	(0040,000B)	ALL	REMOVED		ALWAYS	
Scheduled Station Name	(0040,0010)	ALL	REMOVED		ALWAYS	
Scheduled Procedure Step Location	(0040,0011)	ALL	REMOVED		ALWAYS	
Pre-Medication	(0040,0012)	ALL	REMOVED		ALWAYS	
Performed Station AE Title	(0040,0241)	ALL	REMOVED		ALWAYS	
Performed Station Name	(0040,0242)	ALL	REMOVED		ALWAYS	
Performed Location	(0040,0243)	ALL	REMOVED		ALWAYS	
Performed Procedure Step Start Date	(0040,0244)	ALL	REMOVED		ALWAYS	
Performed Procedure Step End Date	(0040,0250)	ALL	REMOVED		ALWAYS	
Performed Procedure Step End Time	(0040,0251)	ALL	REMOVED		ALWAYS	
Performed Procedure Step ID	(0040,0253)	ALL	REMOVED		ALWAYS	
Performed Procedure Step Description	(0040,0254)	ALL	REMOVED		ALWAYS	
Request Attributes Sequence	(0040,0275)	ALL	REMOVED		ALWAYS	
Comments on the Performed Procedure Step	(0040,0280)	ALL	REMOVED		ALWAYS	
Requested Procedure ID	'(0040,1001)	ALL	REMOVED		ALWAYS	
Patient Transport Arrangements	(0040,1004)	ALL	REMOVED		ALWAYS	
Requested Procedure Location	(0040,1005)	ALL	REMOVED		ALWAYS	
Names of Intended Recipients of Results	(0040,1010)	ALL	REMOVED		ALWAYS	
Intended Recipients of Results Identification Sequence	(0040,1011)	ALL	REMOVED		ALWAYS	
Person Identification Code Sequence	(0040,1101)	ALL	REMOVED		ALWAYS	
Person's Address	(0040,1102)	ALL	REMOVED		ALWAYS	
Person's Telephone Numbers	(0040,1103)	ALL	REMOVED		ALWAYS	
Requested Procedure Comments	(0040,1400)	ALL	REMOVED		ALWAYS	
Reason for the Imaging Service Request	(0040,2001)	ALL	REMOVED		ALWAYS	This Tag is retired
Order Entered By	(0040,2008)	ALL	REMOVED		ALWAYS	
Order Enterer's Location	(0040,2009)	ALL	REMOVED		ALWAYS	
Order Callback Phone Number	(0040,2010)	ALL	REMOVED		ALWAYS	
Placer Order Number / Imaging Service Request	(0040,2016)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
Filler Order Number / Imaging Service Request	(0040,2017)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value
Scheduled Procedure Step Start DateTime	(0040,4005)	ALL	REMOVED		ALWAYS	
Scheduled Procedure Step Modification DateTime	(0040,4010)	ALL	REMOVED		ALWAYS	
Expected Completion DateTime	(0040,4011)	ALL	REMOVED		ALWAYS	
Verifying Organization	(0040,A027)	ALL	REMOVED		ALWAYS	
Performed Station Name Code Sequence	(0040,4028)	ALL	REMOVED		ALWAYS	
Human Performer's Name	(0040,4037)	ALL	REMOVED		ALWAYS	
Performed Procedure Step Start DateTime	(0040,4050)	ALL	REMOVED		ALWAYS	
Procedure Step Cancellation DateTime	(0040,4052)	ALL	REMOVED		ALWAYS	
Verifying Observer Sequence	(0040,A073)	ALL	REMOVED		ALWAYS	
Verifying Observer Name	(0040,A075)	ALL	MODIFIED	De-identified	OTHER	If the Tag has a Value
Author Observer Sequence	(0040,A078)	ALL	REMOVED		ALWAYS	
Participant Sequence	(0040,A07A)	ALL	REMOVED		ALWAYS	
Custodial Organization Sequence	(0040,A07C)	ALL	REMOVED		ALWAYS	
Verifying Observer Identification Code Sequence	(0040,A088)	ALL	REMOVED		ALWAYS	
Person Name	(0040,A123)	ALL	MODIFIED	De-identified	OTHER	If the Tag has a Value
Observation Date '(Trial)	(0040,A192)	ALL	REMOVED		ALWAYS	This Tag is retired
Observation Time '(Trial)	(0040,A193)	ALL	REMOVED		ALWAYS	This Tag is retired
Current Observer '(Trial)	(0040,A307)	ALL	REMOVED		ALWAYS	This Tag is retired
Verbal Source '(Trial)	(0040,A352)	ALL	REMOVE		ALWAYS	This Tag is retired
Address '(Trial)	(0040,A353)	ALL	REMOVED		ALWAYS	This Tag is retired
Telephone Number '(Trial)	(0040,A354)	ALL	REMOVED		ALWAYS	This Tag is retired
Verbal Source Identifier Code Sequence '(Trial)	(0040,A358)	ALL	REMOVED		ALWAYS	This Tag is retired
Graphic Annotation Sequence	(0070,0001)	ALL	REMOVED		ALWAYS	
Content Creator's Name	(0070,0084)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value
Icon Image Sequence	(0088,0200)	ALL	REMOVED		ALWAYS	
Topic Title	(0088,0904)	ALL	REMOVED		ALWAYS	This Tag is retired
Topic Subject	(0088,0906)	ALL	REMOVED		ALWAYS	This Tag is retired
Topic Author	(0088,0910)	ALL	REMOVED		ALWAYS	This Tag is retired
Topic Keywords	(0088,0912)	ALL	REMOVED		ALWAYS	This Tag is retired
Digital Signature UID	(0400,0100)	ALL	REMOVED		ALWAYS	
Referenced Digital Signature Sequence	(0400,0402)	ALL	REMOVED		ALWAYS	
Referenced SOP Instance MAC Sequence	(0400,0403)	ALL	REMOVED		ALWAYS	

Attribute Name	Tag	SOP Class UID	Type of Change	New Value	Condition	Comments
MAC	(0400,0404)	ALL	REMOVED		ALWAYS	
Modified Attributes Sequence	(0400,0550)	ALL	REMOVED		ALWAYS	
Original Attributes Sequence	(0400,0561)	ALL	REMOVED		ALWAYS	
Text String	(2030,0020)	ALL	REMOVED		ALWAYS	
Source Serial Number	(3008,0105)	ALL	REMOVED		ALWAYS	
Reviewer Name	(300E,0008)	ALL	MODIFIED	Empty Value	OTHER	If the Tag has a Value
Arbitrary	(4000,0010)	ALL	REMOVED		ALWAYS	This Tag is retired
Text Comments	(4000,4000)	ALL	REMOVED		ALWAYS	This Tag is retired
Results ID Issuer	(4008,0042)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation Recorder	(4008,0102)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation Transcriber	(4008,010A)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation Text	(4008,010B)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation Author	(4008,010C)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation Approver Sequence	(4008,0111)	ALL	REMOVED		ALWAYS	This Tag is retired
Physician Approving Interpretation	(4008,0114)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation Diagnosis Description	(4008,0115)	ALL	REMOVED		ALWAYS	This Tag is retired
Results Distribution List Sequence	(4008,0118)	ALL	REMOVED		ALWAYS	This Tag is retired
Distribution Name	(4008,0119)	ALL	REMOVED		ALWAYS	This Tag is retired
Distribution Address	(4008,011A)	ALL	REMOVED		ALWAYS	This Tag is retired
Interpretation ID Issuer	(4008,0202)	ALL	REMOVED		ALWAYS	This Tag is retired
Impressions	(4008,0300)	ALL	REMOVED		ALWAYS	This Tag is retired
Results Comments	(4008,4000)	ALL	REMOVED		ALWAYS	This Tag is retired
Digital Signatures Sequence	(FFFA,FFFA)	ALL	REMOVED		ALWAYS	
Data Set Trailing Padding	(FFFC,FFFC)	ALL	REMOVED		ALWAYS	
In addition all Private Data Attributes are removed.						

Table 5.2-11: Standard Header Correction Set *"Remove All Private Data Elements (Pattern Based)"*

Pattern	SOP Class UID	Type of Change	New Value	Condition	Comments
(0008,0080) Institution Name	ALL	REMOVED		ALWAYS	
(0008,0081) Institution Address	ALL	REMOVED		ALWAYS	
(0008,1010)Station Name	ALL	REMOVED		ALWAYS	
(0008,1040) Institutional Department Name	ALL	REMOVED		ALWAYS	
(0008,1070)Operators' Name	ALL	REMOVED		ALWAYS	
(0018,1000) Device Serial Number	ALL	REMOVED		ALWAYS	
(0018,A003) Contribution Description	ALL	REMOVED		ALWAYS	
(50**,****)	ALL	REMOVED		ALWAYS	
(60**,0100)	ALL	REMOVED		ALWAYS	

Pattern	SOP Class UID	Type of Change	New Value	Condition	Comments
(60**,0102)	ALL	REMOVED		ALWAYS	
(60**,3000)	ALL	REMOVED		ALWAYS	
(60**,4000)	ALL	REMOVED		ALWAYS	
In addition, all Private Data Attributes are removed.					

The character * stands for any single digit in the given position in the Tag. If no * is in the pattern, the entire Tag must be indicated. In this case only exact matches are considered.

Please note, that the Pattern Based removal proceeds recursively – it removes the corresponding Tags also from Sequences and Sub-Sequences.

5.2.4 Storage Commitment Service

5.2.4.1 SCU of the Storage Commitment SOP Class

As a Service Class User of the Storage Commitment SOP Class, YSIO X.pree uses the N-ACTION-RQ message to request storage commitment from a remote SCP for all previously stored instances. In turn, it receives N-EVENT-REPORT-RQ messages from the SCP indicating success or failure of the request.

As a Service Class User of the Storage Commitment Push Model SOP Classes the product supports committing all Storage SOP Classes listed in Section 1.1 Content and Transfer.

The Storage Commitment Request will be sent out with a delay after the successful Storage Request, to ensure that the remote node properly indexes received instances. The delay time is configurable with a default delay of 10 minutes. The Storage Commitment Request will be sent on a different association than the Storage Request.

The system may issue one N-ACTION-RQ for a complete set (bundle) of instances or issue one N-ACTION-RQ per instance. This behavior is configurable; the default value is “bundled”.

YSIO X.pree does not support the Storage Media File-Set ID and UID attributes.

YSIO X.pree will accept the N-EVENT-REPORT-RQ on the same association if sent immediately after the N-ACTION-RSP. However, it will not wait for it. The association is closed after three seconds (this is a hard coded value). In this case a reverse role negotiation takes place. YSIO X.pree will serve as an Association Acceptor for the confirmation sent by the Remote DICOM Node.

Table 5.2-12 lists the behavior of YSIO X.pree for possible Failure Reason (0008,1197) in the Failed SOP Sequence (0008,1198) upon receiving an N-EVENT-REPORT request from the SCP with an Event Type ID of 2 (Storage Commitment Request Complete – Failures Exist).

Table 5.2-12: Failure Behavior for Storage Commitment SCU

Status Code	Description	Behavior
0110	Processing failure: A general failure in processing the operation was encountered.	Following processing is in place: • All the incoming Status Codes are logged. • All the incoming Status Codes can be traced. • Providing the Status Codes to the users • The activity provides for the users an API to get all the Status Codes
0122	No such object instance: One or more of the elements in the Referenced SOP Instance Sequence was not available.	
0119	Class / Instance conflict: The SOP Class of an element in the Referenced SOP Instance Sequence did not correspond to the SOP Class registered for this SOP Instance at the SCP.	
0122	Referenced SOP Class not supported: Storage Commitment has been requested for a SOP Instance with a SOP Class that is not supported by the SCP	

Status Code	Description	Behavior
0131	Duplicate transaction UID: The Transaction UID of the Storage Commitment Request is already in use.	
0213	Resource limitation: The SCP does not currently have enough resources to store the requested SOP Instance(s).	

YSIO X.pree has a configurable expiration timeout for the Transaction UID. By default, the timeout for the Transaction UID is 60 minutes. If the N-EVENT-REPORT does not arrive in this time interval, the Archive Operation is considered failed.

5.2.4.2 SCP of the Storage Commitment SOP Class

N/A

5.2.5 Query/Retrieve Service

5.2.5.1 SCU of the Study Root Q/R Information Model – FIND SOP Class

As a Service Class User of the Study Root Q/R - Information Model - FIND SOP Class, YSIO X.pree uses the C-FIND-RQ message and supports the Query Keys listed in Table 5.2-13 for hierarchical queries.

If the data received with the C-FIND-RSP does not specify a Specific Character Set (SCS), it is interpreted according to the default SCS set for YSIO X.pree. If the data received does specify an SCS in the header, it is interpreted accordingly.

In the “Matching Type” column the following Values can be used:

- SINGLE_VALUE: SCU can request Single Value matching on this Attribute.
- MULTIPLE_VALUE: SCU can request multiple search values on this Attribute.
- UID: SCU can request List of UID matching on this Attribute.
- WILDCARD: SCU can request Wildcard matching on this Attribute.
- RANGE: SCU can request Range matching on this Attribute.
- SEQUENCE: SCU can request Sequence matching on this Attribute.
- UNIVERSAL: SCU can request Attribute as a return Value (universal matching).

In the “Query Value Source” column the following Values can be used:

- FIXED: The query Value cannot be modified by the user or by configuration.
- GENERATED: The query Value is generated by the system (e.g. current date as the study date).
- CONFIGURATION: The query Value is dependent on system configuration.
- USER: The query Value is entered by the user.
- SCANNED: The query Value is read from a barcode scanner or similar device.
- EMPTY: The query Value is left empty to indicate it is a return key only.

In the “Display on UI” column the following Values can be used:

- D: the return Value is displayed on the main UI by default.
- C: the return Value is displayed on the main UI if configured.
- N: the return Value is never displayed.

Table 5.2-13: Supported C-FIND Query Keys for Study Root Q/R Model - SCU

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Study Level						
Patient’s Name	(0010,0010)	WILDCARD	USER		D	If input is provided, then an * is added to the end of the search string.

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Patient ID	(0010,0020)	WILDCARD	USER		D	If input is provided, then an * is added to the end of the search string.
Issuer of Patient ID	(0010,0021)	WILDCARD	USER		D	If input is provided, then an * is added to the end of the search string.
Patient's Birth Date	(0010,0030)	SINGLE_VALUE	USER		D	
Patient's Sex	(0010,0040)	UNIVERSAL	EMPTY		D	
Other Patient IDs	(0010,1000)	UNIVERSAL	EMPTY		D	
Other Patient Names	(0010,1001)	UNIVERSAL	EMPTY		D	
Patient Size	(0010,1020)	UNIVERSAL	EMPTY		D	
Patient Weight	(0010,1030)	UNIVERSAL	EMPTY		D	
Military Rank	(0010,1080)	UNIVERSAL	EMPTY		D	
Medical Alerts	(0010,2000)	UNIVERSAL	EMPTY		D	
Allergies	(0010,2110)	UNIVERSAL	EMPTY		D	
Ethnic Group	(0010,2160)	UNIVERSAL	EMPTY		D	
Pregnancy Status	(0010,21C0)	UNIVERSAL	EMPTY		D	
Patient Comments	(0010,4000)	UNIVERSAL	EMPTY		D	
Accession Number	(0008,0050)	WILDCARD	USER		D	If input is provided, then an * is added to the end of the search string.
Study ID	(0020,0010)	WILDCARD	USER		D	If input is provided, then an * is added to the end of the search string.
Study Instance UID	(0020,000D)	UID			D	
Study Date	(0008,0020)	RANGE, SINGLE_VALUE	USER		D	
Study Time	(0008,0030)	RANGE, SINGLE_VALUE	USER		D	Only used together with the Study Date.
Referring Physician' s Name	(0008,0090)	WILDCARD	USER		D	If input is provided, then an * is added to the beginning and the end of the search string.
Study Description	(0008,1030)	UNIVERSAL	EMPTY		D	
Number of Study related Instances	(0020,1208)	UNIVERSAL	EMPTY		C	
Modalities in Study	(0008,0061)	MULTIPLE_VALUE	USER		D	
Number of Study Related Series	(0020,1206)	UNIVERSAL	EMPTY		C	
Series Level						
Modality	(0008,0060)	RANGE	USER		C	
Series Date	(0008,0021)	UNIVERSAL	EMPTY		D	
Series Time	(0008,0031)	UNIVERSAL	EMPTY		D	
Institution Name	(0008,0080)	UNIVERSAL	EMPTY		D	
Institution Address	(0008,0081)	UNIVERSAL	EMPTY		D	
Station Name	(0008,1010)	UNIVERSAL	EMPTY		D	
Performing Physician Name	(0008,1050)	UNIVERSAL	EMPTY		D	
Operators Name	(0008,1070)	UNIVERSAL	EMPTY		D	

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Manufacturer Model Name	(0008,1090)	UNIVERSAL	EMPTY		D	
Body Part Examined	(0018,0015)	UNIVERSAL	EMPTY		D	
Protocol Name	(0018,1030)	UNIVERSAL	EMPTY		D	
Patient Position	(0018,5100)	UNIVERSAL	EMPTY		D	
Laterality	(0020,0060)	UNIVERSAL	EMPTY		D	
Series Number	(0020,0011)	SINGLE_VALUE	USER		C	
Series Description	(0008,103E)	WILDCARD	USER		D	An * is always added to the end of the search string.
Requesting Physician	(0032,1032)	UNIVERSAL	EMPTY		C	
Request Attributes Sequence	(0040,0275)	SEQUENCE	USER		C	
> Requested Procedure ID	(0040,1001)	WILDCARD	USER		C	If input is provided, then an * is added to the end of the search string.
> Scheduled Procedure Step ID	(0040,0009)	WILDCARD	USER		C	If input is provided, then an * is added to the end of the search string.
Performed Procedure Step Start Date	(0040,0244)	RANGE	USER			
Performed Procedure Step Start Time	(0040,0245)	RANGE	USER			Only used together with the Performed Procedure Step Date.
Performed Procedure Step Start DateTime	(0040,4050)	UNIVERSAL	EMPTY			
Series Instance UID	(0020,000E)	UNIVERSAL	EMPTY			
Number of Series related Instances	(0020,1209)					

The user can cancel any running Query. In this case C-CANCEL-FIND-RQ is sent to the SCP. The processing of the data received in the respective Association is stopped and the Association is closed if C-FIND-RSP is received with the Status Canceled. If the confirmation for C-CANCEL-FIND-RQ does not arrive during the Transfer Inactivity Timeout (see Table 6.1-1) the Association will be closed.

5.2.5.2 SCU of the Patient Root Q/R Information Model – FIND SOP Class

N/A

5.2.5.3 SCU of the Patient/Study Only Q/R Information Model – FIND SOP Class

N/A

5.2.5.4 SCU of the Study Root Q/R Information Model – MOVE SOP Class

YSIO X.pree allows the retrieval multiple entries. Query is possible on Study or Series level. Querying on Image Level is not supported.

The user can cancel any running Query. In this case C-CANCEL-MOVE-RQ is sent to the SCP. The processing of the data received in the respective Association is stopped and the Association is closed if C-FIND-RSP is received with the Status Canceled. If the confirmation for C-CANCEL-MOVE-RQ does not arrive during the Transfer Inactivity Timeout (see Table 6.1-1) the Association will be closed.

Sending matching instances to a different AE Title is possible, if requested in the C-MOVE-RQ (Move Destination AE).

If C-MOVE is sent, but no C-STORE-RQ arrives during the Retrieve Transfer Activity Timeout (configurable in the in the config.net repository), the Association is closed, and the job fails. The default timeout value is 20 Minutes.

If the data arrived on the C-MOVE-RQ does contain a reference to a Specific Character Set, YSIO X.pree will handle the binary data accordingly. Is the SCS Information missing in the incoming DICOM message, YSIO X.pree will handle the binary data based on its central SCS setting.

5.2.5.5 SCU of the Patient Root Q/R Information Model – MOVE SOP Class

N/A

5.2.5.6 SCU of the Patient/Study Only Q/R Information Model – MOVE SOP Class

N/A

5.2.5.7 SCP of the Study Root Q/R Information Model – FIND SOP Class

As a Service Class Provider of the Study Root Q/R - Information Model - FIND SOP Class, YSIO X.pree uses the C-FIND-RSP to communicate matches back to the SCU. It supports the Matching Keys listed in Table 5.2-14 for hierarchical queries. As a response to an incoming C-FIND-RQ the data is sent with the SCS specified in the DICOM Header.

In the "Matching Type" column, the following Values can be used:

- SINGLE_VALUE: SCP can perform single Value matching on this Attribute.
- UID: SCP can perform List of UID matching on this Attribute.
- WILDCARD: SCP can perform Wildcard matching on this Attribute.
- RANGE: SCP can perform Range matching on this Attribute.
- SEQUENCE: SCP can perform sequence matching on this Attribute.
- UNIVERSAL: SCP can provide the Attribute in the C-FIND response (universal matching).

Table 5.2-14: Supported C-FIND Attribute Matching for Study Root Q/R Model – SCP

Attribute Name	Tag	Matching Type	Comments
Study Level			
Patient's Name	(0010,0010)	WILDCARD	
Patient ID	(0010,0020)	WILDCARD	
Issuer of Patient ID	(0010,0021)	WILDCARD	
Patient's Birth Date	(0010,0030)	RANGE, SINGLE_VALUE	
Patient's Birth Time	(0010,0032)	RANGE	
Patient's Sex	(0010,0040)	SINGLE_VALUE	
Accession Number	(0008,0050)	WILDCARD	
Study ID	(0020,0010)	WILDCARD	
Study Instance UID	(0020,000D)	UID	
Study Date	(0008,0020)	RANGE, SINGLE_VALUE	
Study Time	(0008,0030)	RANGE	
Referring Physician' s Name	(0008,0090)	WILDCARD	
Study Description	(0008,1030)	WILDCARD	
Modalities in Study	(0008,0061)	SEQUENCE	
Series Level			
Modality	(0008,0060)	SEQUENCE	
Series Date	(0008,0021)	RANGE, SINGLE_VALUE	
Series Time	(0008,0031)	RANGE	
Series Number	(0020,0011)	SINGLE_VALUE	

Attribute Name	Tag	Matching Type	Comments
Series Description	(0008,103E)	WILDCARD	
Request Attributes Sequence	(0040,0275)	WILDCARD	
> Requested Procedure ID	(0040,1001)	WILDCARD	
> Scheduled Procedure Step ID	(0040,0009)	WILDCARD	
Performed Procedure Step Start Date	(0040,0244)	RANGE, SINGLE VALUE	
Performed Procedure Step Start Time	(0040,0245)	RANGE	
Series Instance UID	(0020,000E)	UID	
Instance Level			
Instance Number	(0020,0013)	WILDCARD	
SOP Instance UID	(0008,0018)	UID	
SOP Class UID	(0008,0016)	UID	

If a C-CANCEL-FIND-RQ is received, the processing of the Query is stopped, and a Confirmation is sent (in form of a C-FIND-RSP with the Status Cancelled). After sending the Confirmation, the Association is closed.

5.2.5.8 SCP of the Patient Root Q/R Information Model – FIND SOP Class

As a Service Class Provider of the retired Patient Root Q/R - Information Model - FIND SOP Class, the YSIO X.pree uses the C-FIND-RSP to communicate matches back to the SCU. It supports the Matching Keys listed in Table 5.2-14 for hierarchical queries.

YSIO X.pree supports the same Matching Attributes for the Patient/Study Only Q/R - Information Model - FIND SOP Class as for the Study Root Q/R - Information Model - FIND SOP Class (see Table 5.2-14).

If a C-CANCEL-FIND-RQ is received, the processing of the Query is stopped, and a Confirmation is sent (in form of a C-FIND-RSP with the Status Cancelled). After sending the Confirmation, the Association is closed.

5.2.5.9 SCP of the Patient/Study Only Query Information Model - FIND SOP Class

As a Service Class Provider of the Patient/Study Only Q/R - Information Model - FIND SOP Class, YSIO X.pree uses the C-FIND-RSP to communicate matches back to the SCU. It supports the Matching Keys listed in Table 5.2-14 for hierarchical queries.

YSIO X.pree supports the same Matching Attributes for the Patient/Study Only Q/R - Information Model - FIND SOP Class as for the Study Root Q/R - Information Model - FIND SOP Class (see Table 5.2-14).

If a C-CANCEL-FIND-RQ is received, the processing of the Query is stopped, and a Confirmation is sent (in form of a C-FIND-RSP with the Status Cancelled). After sending the Confirmation, the Association is closed.

5.2.5.10 SCP of the Study Root Q/R Information Model – MOVE SOP Class

As the SCP of the Study Root Q/R – Information Model –MOVE, YSIO X.pree receives the C-MOVE-RQ and in turn uses the C-STORE-RQ sub operation to send matching SOP Instances to the Move Destination AE included in the C-MOVE-RQ.

If a C-CANCEL-MOVE-RQ is received, the processing is stopped, and a Confirmation is sent (in form of a C-MOVE-RSP with the Status Cancelled). After sending the Confirmation, the Association is closed.

5.2.5.11 SCP of the Patient Root Q/R - Information Model – MOVE SOP Class

As the SCP of the Patient Root Q/R – Information Model –MOVE, YSIO X.pree receives the C-MOVE-RQ and in turn uses the C-STORE-RQ sub operation to send matching SOP Instances to the Move Destination AE included in the C-MOVE-RQ.

If a C-CANCEL-MOVE-RQ is received, the processing is stopped, and a Confirmation is sent (in form of a C-MOCE-RSP with the Status Cancelled). After sending the Confirmation, the Association is closed.

5.2.5.12 SCP of the Patient/Study Q/R - Information Model – MOVE SOP Class

As the SCP of the Patient/Study Root Q/R – Information Model –MOVE, YSIO X.pree receives the C-MOVE-RQ and in turn uses the C-STORE-RQ sub operation to send matching SOP Instances to the Move Destination AE included in the C-MOVE-RQ.

If a C-CANCEL-MOVE-RQ is received, the processing is stopped, and a Confirmation is sent (in form of a C-MOVE-RSP with the Status Cancelled). After sending the Confirmation, the Association is closed.

5.2.6 Print Management Service

Please note, that YSIO X.pree does not support printing DICOM images to usual printers on plain paper.

5.2.6.1 SCU of the Basic Grayscale Print Management Meta SOP Class

The Basic Grayscale Print Management Meta SOP Class is composed of the mandatory SOP Classes listed in Table 5.2-15.

Table 5.2-15: Basic Grayscale Print Management Meta SOP Classes - SCU

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

5.2.6.1.1 Basic Film Session SOP Class

The Basic Film Session describes all the user-defined parameters, which are common for all the films of a film session. The Basic Film Session refers to one or more Basic Film Boxes that are printed on one hardcopy printer.

Table 5.2-16 lists the supported DIMSE Services for the Basic Film Session SOP Class:

Table 5.2-16: Services for the Basic Film Session SOP Class - SCU

DIMSE Service Element	Purpose
N-CREATE	Create the film session
N-DELETE	Delete the film session

Table 5.2-17 lists the supported N-CREATE Attributes for Basic Film Session:

Table 5.2-17: Supported N-CREATE Attributes for the Basic Film Session SOP Class - SCU

Attribute Name	Tag	Values	Default
Number of Copies	(2000,0010)	1	
Medium Type	(2000,0030)	BLUE FILM CLEAR FILM MAMMO BLUE FILM MAMMO CLEAR FILM PAPER	

The Affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Session.

The N-DELETE-RQ on the Basic Film Session SOP Class is used to remove the complete Basic Film Session SOP Instance hierarchy.

Table 5.2-18 lists the supported N-DELETE Attributes for Basic Film Session:

Table 5.2-18: Supported N-DELETE Attributes for the Basic Film Session SOP Class - SCU

Attribute Name	Tag	Values	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.1	
Requested SOP Instance UID	(0000,1001)		

5.2.6.1.2 Basic Film Box SOP Class

The Basic Film Box describes all user-defined parameters of one film of the film session including presentation parameters, which are common for all images on a given film sheet.

The Basic Film Box refers to one or more Image Boxes.

Table 5.2-19 lists the supported DIMSE Services for the Basic Film Box SOP Class:

Table 5.2-19: Supported Services for the Basic Film Box SOP Classes

DIMSE Service Element	Purpose
N-CREATE	Create the film Box in a previously created film session
N-ACTION	Print the Film Box
N-DELETE	Delete the Film Box

Table 5.2-20 lists the supported N-CREATE Attributes for Basic Film Box. The actual values for each attribute depend on DICOM printer configuration within the YSIO X.pree DICOM Print Management SCU:

Table 5.2-20: Supported N-CREATE Attributes for the Basic Film Box SOP Class - SCU

Attribute Name	Tag	Values	Default
Image Display Format	(2010,0010)	STANDARD\C,R	STANDARD\1,1
Film Orientation	(2010,0040)	PORTRAIT LANDSCAPE	
Film Size ID	(2010,0050)	8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM	
Magnification Type	(2010,0060)	REPLICATE BILINEAR CUBIC NONE	
Border Density	(2010,0100)	BLACK WHITE	
Minimum Density	(2010,0120)	0 < value	
Maximum Density	(2010,0130)	0..50	
Illumination [1)]	(2010,015E)	0 < value	
Reflective Ambient Light [1)]	(2010,0160)	0 < value	
Ref. Film Session Seq.	(2010,0500)		
>Ref. SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.1	
>Ref. SOP Instance UID	(0008,1155)		

Attribute Name	Tag	Values	Default
Ref. Presentation LUT Seq. 1)	(2050,0500)		
>Ref. SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.23	
>Ref. SOP Instance UID	(0008,1155)		

1) Required if Presentation LUT is present

For Page Mode printing, the Image Display format used is STANDARD\1,1.

The N-CREATE-RSP message from the Print SCP includes the Referenced Image Box Sequence with SOP Class/Instance UID pairs which will be kept internally to be further used for the subsequent Basic Image Box SOP Class N-SET-RQ messages.

When all Image Boxes (including parameters) for the film-sheet have been set, the YSIO X.pree print manager will issue an N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g., N-DELETE-RQ) on the Basic Film Box.

Table 5.2-21 lists the supported N-ACTION Attributes for Basic Film Box SOP Class:

Table 5.2-21: Supported N-ACTION Attributes for the Basic Film Box SOP Class - SCU

Attribute Name	Tag	Value	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.2	
Requested SOP Instance UID	(0000,1001)		
Action Type ID	(0000,1008)	1 (Print)	

Table 5.2-22 lists the supported N-DELETE Attributes for Basic Film Box Class:

Table 5.2-22: Supported N-DELETE Attributes for the Basic Film Box SOP Class - SCU

Attribute Name	Tag	Value	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.2	
Requested SOP Instance UID	(0000,1001)		

5.2.6.1.3 Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box is the presentation of an image and image related data in the image area of a film. The Basic Image Box describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

Table 5.2-23 lists the supported DIMSE Service for the Basic Grayscale Image Box SOP Class:

Table 5.2-23: Services for the Basic Grayscale Image Box SOP Class

DIMSE Service Element	Purpose
N-SET	Set Image Attributes for a previously created film box

Table 5.2-24 lists the supported N-SET Attributes for Basic Grayscale Image Box:

Table 5.2-24: Supported N-SET Attributes for the Basic Grayscale Image Box SOP Class -SCU

Attribute Name	Tag	Values	Default
Image Box Position	(2020,0010)	1	
Basic Grayscale Image Sequence	(2020,0110)		
>Samples per Pixel	(0028,0002)	1	
>Photometric Interpretation	(0028,0004)	MONOCHROME2	
>Rows	(0028,0010)		
>Columns	(0028,0011)		
>Pixel Aspect Ratio	(0028,0034)		
>Bits Allocated	(0028,0100)	8 16	
>Bits Stored	(0028,0101)	8 12	
>High Bit	(0028,0102)	7 11	
>Pixel Representation	(0028,0103)	0	0
>Pixel Data	(7FE0,0010)		

5.2.6.1.4 Printer SOP Class

The Printer SOP Class provides the possibility to monitor the status of the hardcopy printer in a synchronous and in an asynchronous way.

When used synchronously the YSIO X.pree Print SCU uses the N-GET-RQ to request information about the printer status.

Table 5.2-25 lists the supported DIMSE Services for the Printer SOP Class:

Table 5.2-25: Services for the Printer SOP Class

DIMSE Service Element	Purpose
N-EVENT-REPORT	Report the printer status in an asynchronous way
N-GET	Explicit request to find out the printer status.

Before the N-CREATE messages are sent to set up the Basic Film Session, an N-GET message is sent to the DICOM Printer so request its status.

YSIO X.pree supports the reverse role negotiation of the Printer SOP Class. An N-EVENT-REPORT request can be received by the SCU at any time during a print job using the reverse role negotiation.

Receiving the N-EVENT-REPORT-RQ from a printer YSIO X.pree is asynchronously informed about changes of the printer status.

All incoming N-EVENT-REPORT-RQ are handled and analyzed during the Printing process. Every Printer Status notification is forwarded to the user via the DICOM Print Service if the Status has changed since the last notification.

Table 5.2-26 summarizes the behavior of the SCU when receiving Event Types within the N-EVENT-REPORT.

Table 5.2-26: Printer SOP Class N-EVENT-REPORT Behavior

Event Type Name	Event Type ID	Behavior
Normal	1	
Warning	2	
Failure	3	If a Print job is running, it will be cancelled.

Table 5.2-27: Supported N-GET Attributes for the Printer SOP Class - SCU lists the supported N-GET Attributes for Printer SOP Class:

Table 5.2-27: Supported N-GET Attributes for the Printer SOP Class - SCU

Attribute Name	Tag	Behavior
Printer Status	(2110,0010)	NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	See Annex F DICOM Print SCU – Detailed Status Displays

5.2.6.2 SCU of the Basic Color Print Management Meta SOP Class

The Basic Color Print Management Meta SOP Class is composed of the mandatory SOP Classes listed in Table 5.2-28:

Table 5.2-28: Basic Color Print Management Meta SOP Classes

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.16

5.2.6.2.1 Basic Film Session SOP Class

The parameters for the Basic Film Session SOP Class of the Basic Color Print Management Meta SOP Class are the same as described for the Basic Grayscale Print Management Meta SOP Class in Section 5.2.6.1.1.

5.2.6.2.2 Basic Film Box SOP Class

The parameters for the Basic Film Box SOP Class of the Basic Color Print Management Meta SOP Class are the same as described for the Basic Grayscale Print Management Meta SOP Class in Section 5.2.6.1.2.

5.2.6.2.3 Basic Color Image Box SOP Class

Table 5.2-29 lists the supported DIMSE Service for the Basic Color Image Box SOP Class:

Table 5.2-29:Services for the Basic Color Image Box SOP Class - SCU

DIMSE Service Element	Purpose
N-SET	Set each Image Attributes for a previously created film box

Table 5.2-30 lists the supported N-SET Attributes for Basic Color Image Box:

Table 5.2-30: Supported N-SET Attributes for the Basic Color Image Box SOP Class - SCU

Attribute Name	Tag	Values	Default
Image Box Position	(2020,0010)	1	
Basic Color Image Sequence	(2020,0111)		
>Samples per Pixel	(0028,0002)	3	
>Photometric Interpretation	(0028,0004)	RGB	
>Planar Configuration	(0028,0006)	0	
>Rows	(0028,0010)		
>Columns	(0028,0011)		
>Pixel Aspect Ratio	(0028,0034)		
>Bits Allocated	(0028,0100)	8	
>Bits Stored	(0028,0101)	8	
>High Bit	(0028,0102)	7	
>Pixel Representation	(0028,0103)	0	
>Pixel Data	(7FE0,0010)		

5.2.6.2.4 Printer SOP Class

The parameters for the Printer SOP Class of the Basic Color Print Management Meta SOP Class are the same as described for the Basic Grayscale Print Management Meta SOP Class in Section 0.

5.2.6.3 SCU of the Basic Annotation Box SOP Class

N/A

5.2.6.4 SCU of the Print Job SOP Class

Every incoming N-EVENT-REPORT-RQ message is processed and analyzed if a printing is in progress. Is a print job already running and the DIMSE Status received does point to a Failure or a Warning, a Job Status Notification is issued to the user (via the DICOM Print Service). Additionally, the job gets cancelled.

Table 5.2-31 lists the supported DIMSE Services for the Print Job SOP Class:

Table 5.2-31: Services for the Print Job SOP Class - SCU

DIMSE Service Element	Purpose
N-EVENT-REPORT	Report the printer status in an asynchronous way

An N-EVENT-REPORT request can be received by the SCU at any time during an Association if the Print Job SOP Class has been negotiated by the SCU.

Table 5.2-32 summarizes the behavior of the SCU when receiving Event Types within the N-EVENT-REPORT.

Table 5.2-32: Print Job SOP Class N-EVENT-REPORT Behavior

Event Type Name	Event Type ID	Behavior
Pending	1	No action taken
Printing	2	No action taken
Done	3	No action taken
Failure	4	The failure code is reported to the user and the Print Job itself is cancelled.

5.2.6.5 SCU of the Presentation LUT SOP Class

The objective of the Presentation LUT is to realize image hardcopy printing tailored for specific modalities, applications and user preferences.

The output of the Presentation LUT is Presentation Values (P-Values). P-Values are approximately related to human perceptual response. They are intended to facilitate common input for hardcopy. P-Values are intended to be independent of the specific class or characteristics of the hardcopy device.

Table 5.2-33 lists the supported DIMSE Services for the Presentation LUT SOP Class:

Table 5.2-33: Services for the Presentation LUT SOP Class - SCU

DIMSE Service Element	Purpose
N-CREATE	Create the Presentation LUT Instance
N-DELETE	Delete the Presentation LUT Instance

Table 5.2-34 lists the supported N-CREATE Attributes for Presentation LUT:

Table 5.2-34: Supported N-CREATE Attributes for the Presentation LUT SOP Class-SCU

Attribute Name	Tag	Values	Default
Presentation LUT Shape	(2050,0020)	IDENTITY	

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and is used for later requests on the Basic Film Box (N-CREATE-RQ) and on the Presentation LUT (N-DELETE-RQ).

Table 5.2-35 lists the supported N-DELETE Attributes for Presentation LUT

Table 5.2-35: Supported N-DELETE Attributes for the Presentation LUT SOP Class - SCU

Attribute Name	Tag	Value	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.23	
Requested SOP Instance UID	(0000,1001)		

5.2.7 Acquisition Workflow

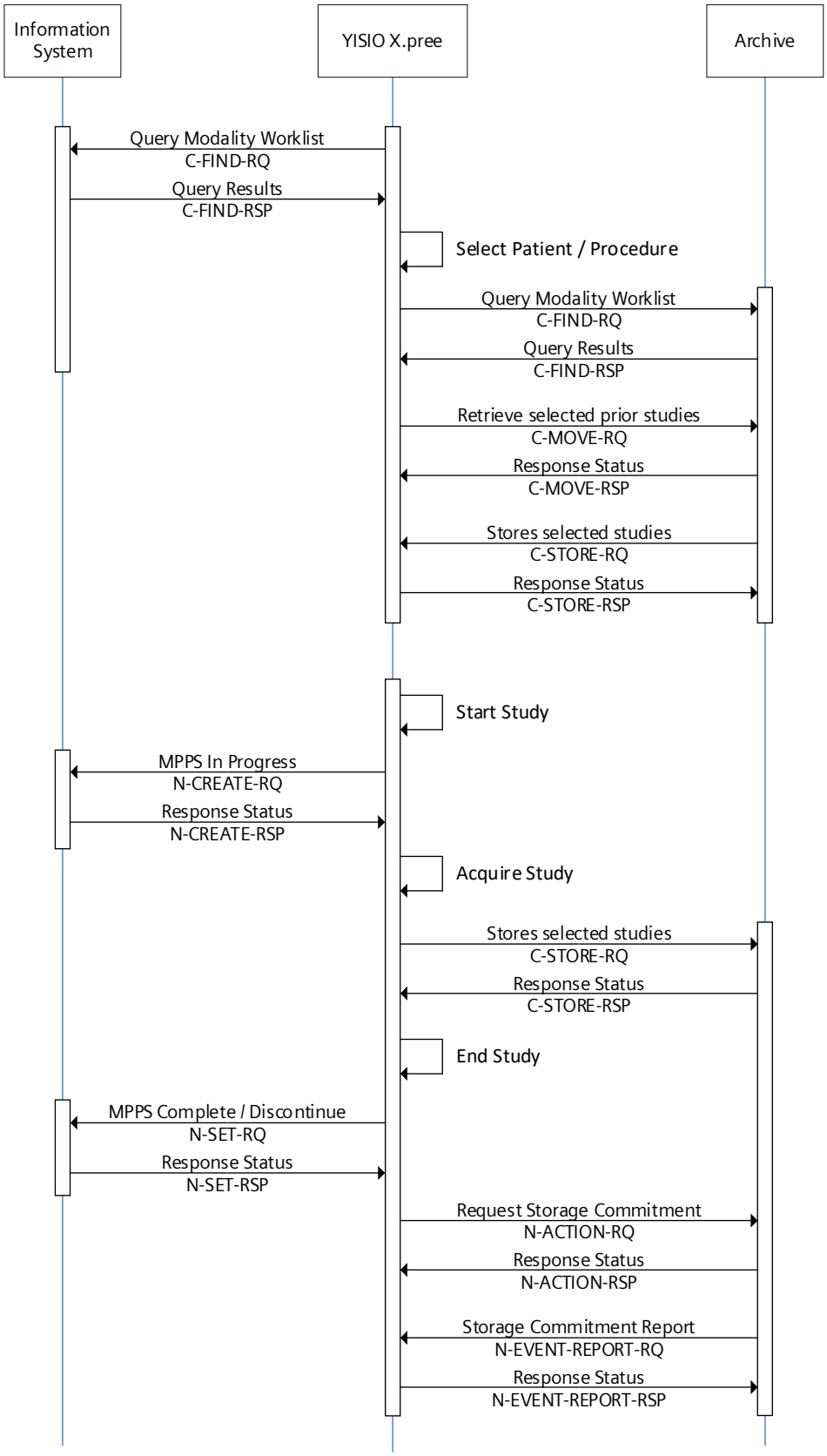


Figure 5.2-1: Sequence of Real-World Activities– Acquisition Workflow

5.2.8 Printing Workflow

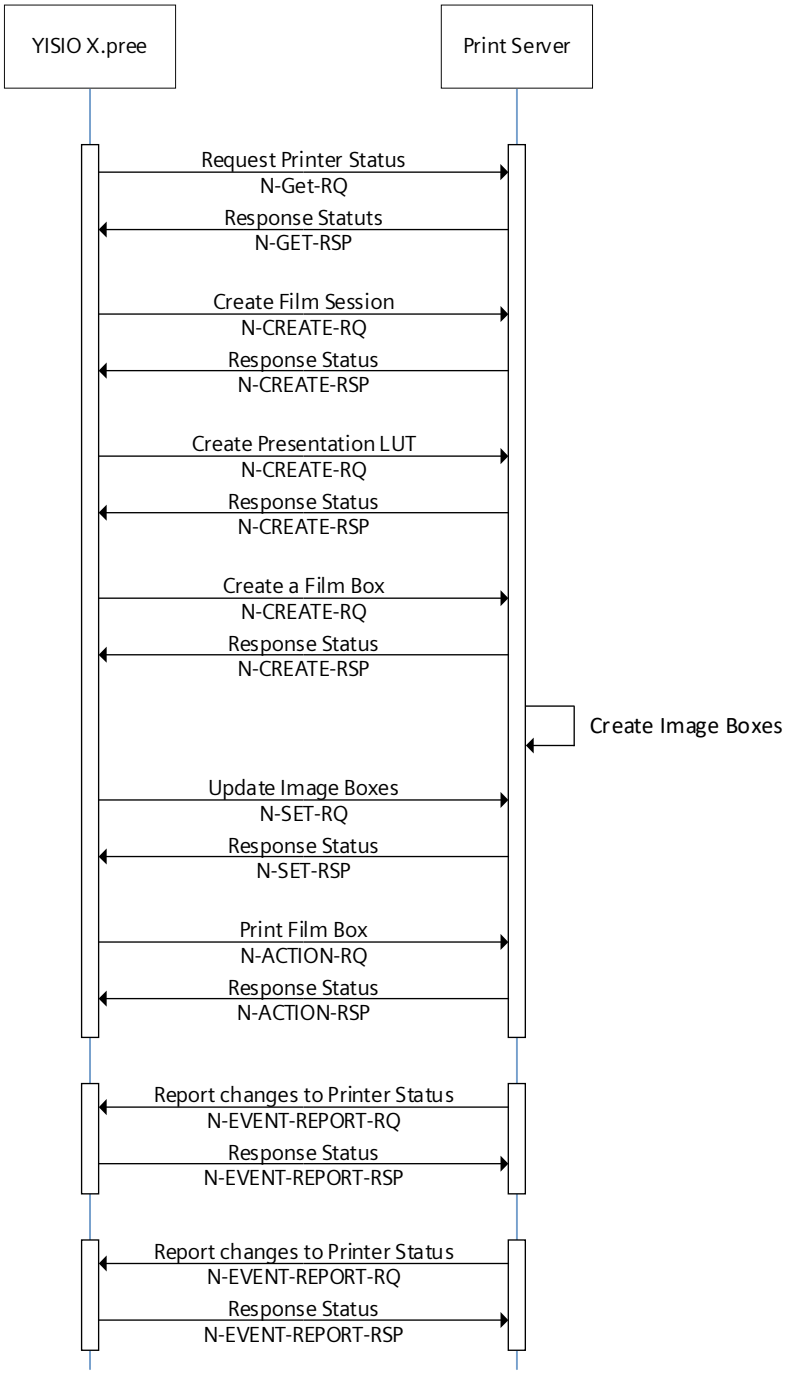


Figure 5.2-2: Real-World Activities for Storage AE

5.3 Media Service

5.3.1 File Set Creator (FSC)

YSIO X.pree supports creating the Basic Directory IOD as a File Set Creator as defined in Annex A.2, Basic Directory IOD.

For a list of supported Media Application Profiles, see section 0 in the Overview.

For a list of supported SOP Classes, see section 1.1 in the Overview.

5.3.1.1 Media Profile Selection Mechanism

YSIO X.pree provides following options for a data export to a physical medium:

1. If the data exported should or should not be compressed.
2. If a DICOM Viewer should be written on the medium or not.
3. Data Minimization options: High Privacy, Reduced Privacy and Low Privacy. Additionally, a Pseudonym can be indicated, which will be used in the Data Minimization process.

The compression algorithm is selected from a user definable prioritized list of three algorithms. The list can be edited on the Administration Portal. The highest priority algorithm, that fits the data to be compressed will be applied.

The selection of the applicable Media Profile is based on the options described above, as described in Table 5-36.

Table 5-36: Media Profile Selection

Destination	Compression algorithm applied [1)]	DICOM File System used	Image Conversion applied	Data Minimization	Selected Media Profile
General Purpose USB media	JPEG 2000	Yes	Enhanced	Yes (Profile High)	STD-GEN-USB-J2K
	JPEG 2000	Yes	(not relevant)	(No or any other Profile)	AUG-GEN-USB-J2K

[1)] The exact Transfer Syntax applied in this case is decided by the Configuration (see Default Media Compression in Table 6.4-1: Media Storage Service Parameters).

5.3.1.2 Augmented Application Profiles

The standard application profiles are augmented with private object Siemens CSA Non-Image.

Table 5-37: Private SOP Classes and Transfer Syntaxes for Augmented Media Profiles

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M

The Siemens non-image is typically used for raw data and 3D private data.

5.3.2 File Set Reader (FSR)

YSIO X.pree supports the Media Application Profiles listed in Section 0 in the Overview.

For a list of supported SOP Classes, see section 1.1 in the Overview.

To display or process DICOM Instances contained on the Media, see section 5.2.3.2.

5.3.3 File Set Updater (FSU)

YSIO X.pree does not support the update of previously created Basic Directory IODs.

For a list of supported Media Application Profiles, see section 0 in the Overview.

For a list of supported SOP Classes, see section 1.1 in the Overview.

5.4 Cross Service Considerations

This section describes Interactions between the implementation of different DICOM Services in this product. Details internal to an individual service are addressed in previous Service Sections.

Note: The DICOM Standard typically does not define cross-service requirements. Therefore this section provides implementation descriptions and not strictly DICOM Conformance.

5.4.1 PACS initiated Archiving

YSIO X.pree provides an additional Archiving possibility, which is based on a retrieve request from a Remote DICOM Node, which is registered as a PACS.

Following the Retrieve Request of the PACS machine, a Network Transfer, in form of an Archiving Request (C-STORE) will be initiated by YSIO X.pree.

5.4.2 Autorouting

YSIO X.pree provides a possibility to configure Autorouting rules.

An Autorouting rule allows to automatically forward DICOM Instances to one or more Remote DICOM Nodes. The decision of forwarding can be based on the AET of the sender node or the value of certain Tags in the DICOM Instance.

Such a rule can be applied immediately or during the default archiving (or sending) process.

The configuration can be done on the Administration Portal.

5.4.3 Correction and re-arrangement

The user has the possibility to perform corrections on the DICOM Data stored in the System. If after such an operation the data leaves the system (via Export or Send), the original data is stored according to the DICOM Standard and the corrections are applied.

When a Study is moved to a different:

- Procedure, the Study Instance UID is overwritten with the Study Instance UID and Accession- Number of the Procedure.
- Patient, the system generates a new Study Instance UID.

The system will not update references to the changed Study Instance UIDs, therefore it is possible that there will be broken links between Studies after such move operations.

In case of Patient Merge and Correction no UIDs are changed, therefore it is advised to delete any corrected or rearranged objects from the PACS before attempting to archive them again, to ensure that the PACS system can store them successfully.

When the Patient Birth Date or the Study Date is corrected, the system recalculates the Patient Age. A new item containing attributes that were removed or replaced by other values is added to the Original Attribute Sequence (0400,0561).

5.5 Specific Character Sets

For Specific Character Sets in addition to the default character repertoire, refer to Section 1.5 for the Values for Specific Character Set (0008,0005).

All Specific Character Sets (SCS) listed in Section 1.5 are supported for incoming Data. When creating new Instances, the system will use the default SCS (or SCS List) configured on the machine.

When there is a mismatch between the given character set in attribute (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

- Convert each illegal character to '?'

There are three categories of character sets which must be differentiated because of their different encoding formats:

- Conventional ISO character sets: ISO_IR 6, ISO 2022 IR 6, ISO_IR 100, etc. → encoded in ISO 2022
- ISO_IR 192 → encoded in UTF-8
- GB18030 → encoded in GB18030.

It is not possible to recognize the following mismatches automatically on receiving or importing:

- An attribute value is encoded in ISO_IR 192 ←→ (0008,0005) contains a conventional ISO character set as primary character set.
- An attribute value is encoded in GB18030 ←→ (0008,0005) contains a conventional ISO character set as primary character set.
- An attribute value is encoded in ISO 2022 ←→ (0008,0005) contains ISO_IR 192.
- An attribute value is encoded in ISO 2022 ←→ (0008,0005) contains GB18030.

An IOD that contains one of the above-mentioned inconsistencies is not DICOM conform. As these kinds of inconsistencies cannot be recognized by the system, the IOD will not be rejected but the character data might be corrupted.

YSIO X.pree supports Kanji characters in the byte zones after 74 (79, 7A, 7B and 7C).

YSIO X.pree does not support Conversion or Mapping to Non-Default Specific Character Sets.

6 Configuration

Throughout all subsections the following Values can be used in the "Configurable" column:

- USER: The parameter is configurable by the user.
- SERVICE: The parameter is configurable by service personnel.
- FIXED: The parameter is not configurable (it has a fixed Value). The Value is required for the configuration of the remote system.
- N/A: The parameter is not applicable for the local or the remote system.

YSIO X.pree does not limit the number of the configurable Remote Nodes. This applies to all the DIMSE Services. The communication capability is only limited by the Operation System.

Please note, that having lots of Remote Nodes (2000 or more) can affect the loading speed of the different GUIs.

Every Configuration where IP-Addresses are implied, IPv4 or IPv6 can be used.

6.1 General Configuration Parameters

Table 6.1-1 lists general configuration parameters applicable across all supported DICOM Services.

Table 6.1-1: General Configuration Parameters

Parameter	Configurable	Default Value	Comments
Store graphical objects and annotations	USER	"Save as overlay"	Possibilities are - "Save as overlay" - "Burn into pixel data"
Bit depth for RAD images	USER	"16 Bit"	Possibilities are - "16 Bit" - "12 Bit"
Format for RAD images	USER	DX	Possibilities are - "DX" - "CR"
Contrast/Bolus Agent	USER	N/A	Free text Contrast/Bolus Agents can be configured that a user can select during acquisition and that are written into (0018,0010).
General Parameters			
Timeout waiting for acceptance or rejection Response to an Association Open Request. (Association Negotiation Timeout, Application-Level)	USER	30 seconds	Value range: 1 – 120 seconds
Timeout waiting for a response to an Association release request (Transfer Inactivity Timeout, Application-Level)	USER	30 seconds	Value range: 1 – 120 seconds The value of the timeout waiting for acceptance or rejection Response to an Association Open Request will be used.
General DIMSE level timeout Values	USER	30 Seconds	Value range 1 – 300 seconds
TCP/IP Settings			
TCP/IP Send Buffer	FIXED	65535 Bytes	
TCP/IP Receive Buffer	FIXED	65535 Bytes	
TCP/IP Socket Timeout	USER	5 seconds	Value range: 1 – 60 Seconds.

Parameter	Configurable	Default Value	Comments
Maximum PDU size	USER	32 KB	32768 Bytes Value range: 16 – 512 KB
DICOM Services Parameters			
Maximum number of simultaneous Associations accepted	SERVICE	12	Please find the data in the respective chapters describing the Service.
Specific Character Set	USER	ISO IR 100	
Timeout for waiting for a Service Request/Response message from the remote node (Storage SCP/SCU)		30 seconds	
Timeout for waiting for a Service Request/Response message from the remote node (Query/Retrieve SCP/SCU)		30 seconds	
Timeout for waiting for a C-MOVE-RSP	FIXED	1200 seconds	
Number of image collection before saving to database		20	
Max matches query limit		100	

Please do note, that the default values and some of the value ranges are provided by the templates for the different Remote Nodes of different types. The set of templates is extendable. This is applicable for the general and special parameters.

6.2 Configuration of DIMSE Services

The tables in the following subsections show the configuration parameters required for DIMSE Services.

To identify whether YSIO X.pree is an SCP and / or an SCU, the following applies:

- SCP: The (Secured) Local Called AET and Remote Calling AET parameters are present.
- SCU: The (Secured) Local Calling AET and Remote Called AET parameters are present.

6.2.1 AE Titles

AE Titles shall be unique within the hospital. A common way to achieve that is to use the hostname as part of the AE Titles. The string can be up to 16 characters and must not contain any extended characters. Only 7-bit ASCII characters (excluding Control Characters) are allowed according to the DICOM Standard.

6.2.2 Local Application Entity

YSIO X.pree allows to configure AE Titles, Ports and Services in any wished way. Default delivery is that all services are using the same AE title and only one port number. In case the connected systems cannot handle this default, the customer service engineer is able to configure for each service its own AE title and Port number.

6.2.3 Remote Application Entities

To enable a fast and efficient configuration possibility Siemens Healthineers will deliver templates for known configuration examples, so that the behavior (usage of one AE title, default port numbers, supported services) is determined already through the template.

Remote Application Entities can be configured without restarting the process.

6.2.3.1 Remote Association Initiators

All relevant remote applications that may setup DICOM associations towards YSIO X.pree need to be configured in YSIO X.pree, before the association can be established. This behavior is configurable, but it is recommended, not to change this behavior.

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and initially set at the time of installation by Installation Personnel. Changes can later also be performed by the local system administrator. The Application Entity Titles and supported transfer syntaxes need to be known for configuration.

6.2.3.2 Remote Association Acceptors

For remote applications that shall be able to accept DICOM associations from YSIO X.pree, the following information needs to be available:

- Application Entity Title
- Host Name / IP address on which the remote application service runs
- Port number on which the remote application accepts association requests.

The remote system will be indicated in the UI of YSIO X.pree with a logical name, that is also entered when configuring the node in the administration UI.

6.2.4 Basic Worklist Management Service Configuration

Table 6.2-1 lists Worklist Service configuration parameters:

Table 6.2-1: Worklist Service Parameters

Local Configuration Parameters – Worklist			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE	The machine name	
Only allow encrypted DICOM communication for incoming connections	SERVICE	(not set)	
Logical Name	SERVICE		
Location	SERVICE		
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Worklist provider (DIS)	SERVICE	None	A Remote Node can be selected from the list of Remote Nodes, which do have configured a Worklist AE as SCP.
Query interval	SERVICE	0 Minutes	The default setting (0 Minute) means, that no query will be initiated (off).
Time to keep unassigned worklist items after disappearance from DIS	SERVICE	180 Minutes	
Time window for scheduled procedure step start date	SERVICE	1 day into the past 1 day into the future	
Worklist Query Attributes and their Values	SERVICE		The user can select the return key attributes for Worklist Queries.
Matching criteria to use for Worklist Query	SERVICE		The user can add matching criteria for Modality (0008.0060), Application Entity Title (0040,0001) and Performing Physician (0040,0006). The user can select two additional DICOM Tag from a list and provide some matching criteria for them.
Remote Configuration Parameters – Worklist			

Parameter	Configurable	Default Value	Comments
Called AE Title (SCP)	SERVICE		
Port	SERVICE	1024	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		
Use encrypted DICOM communication for outgoing connections	SERVICE	(not set)	

6.2.5 Modality Performed Procedure Step Service Configuration

Table 6.2-2 lists Modality Performed Procedure Step Service configuration parameters:

Table 6.2-2: MPPS Service Parameters

Local Configuration Parameters – MPPS			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERIVCE	The machine name	
Called AE Title (SCP)	SERVICE	The machine name	
Port	SERVICE	104	Value range: 1 – 65536
TLS-Secured-Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		The physical location of the machine representing the Remote Node.
Only allow encrypted DICOM communication for incoming connections	SERVICE	(not set)	
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Remote Configuration Parameters – MPPS			
Parameter	**Configurable**	**Default Value**	**Comments**
Called AE Title (SCP)	SERVICE		
Port	SERVICE	5207	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Use encrypted DICOM communication for outgoing connections	SERVICE	(not set)	
Hostname	SERVICE		
IP Address	SERVICE		
Send procedure step to <Remote Node Name> when requested procedure was scheduled from <Worklist provider (DIS)> (see Table 6.2-1: Worklist Service Parameters)	SERVICE	(none selected)	For every Worklist Provider Remote Node (DIS) one line is displayed. Every line or none can be selected.
Send procedure step to <Remote Node> when requested procedure was unscheduled (locally generated)	SERVICE	(none selected)	For every Worklist Provider Remote Node (DIS) one group is displayed. Every line or none can be selected.

6.2.6 Unified Worklist and Procedure Step Service Configuration

N/A

6.2.7 Instance Availability Notification Service Configuration

N/A

6.2.8 Storage Service Configuration

Table 6.2-3 lists Storage Service configuration parameters:

Table 6.2-3: Storage Service Parameters

Local Configuration Parameters – Storage			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE	The machine name	
Called AE Title (SCP)	SERVICE	The machine name	
Port	SERVICE	104	Value range: 1 – 65536
TLS-Secured Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Only allow encrypted DICOM communication for incoming connections	SERVICE	false	If set, the Local Node will only accept encrypted communication (TLS handshake).
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Transfer Syntax Optimization	SERVICE	Uncompressed Format (low CPU load)	The user can select, if YSIO X.pree should favor compressed or uncompressed syntax.
Remote Configuration Parameters – Storage			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE		
Called AE Title (SCP)	SERVICE		
Port	SERVICE	5104	Value range: 1 – 65536
TLS-Secured Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Only allow encrypted DICOM communication for outgoing connections	SERVICE	(not set)	
Hostname	SERVICE		
IP Address	SERVICE		
Transfer Syntaxes to be Excluded (SCU)	SERVICE		Transfer Syntaxes can be excluded for all SOP Classes or for specific SOP Classes. If excluded, no Association Request with the excluded Transfer Syntaxes will be sent.
Header Correction Ruleset (SCU)	SERVICE		The selected Header Correction Ruleset will be applied for DICOM Data to be sent. Beside a default list of Header Correction Ruleset, the User can define own Header Correction Rulesets.

Storage Commitment (SCU)	SERVICE	ENABLED	If Storage Commitment is disabled, the archive state is only updated based on the transfer result. Permanent data storage is not ensured, and data loss may result.
Encapsulate Non-Supported Objects (SCU)	SERVICE	ENABLED (Basic Text Structured Report Format)	If the User enable this option, non-supported objects will be encapsulated in the "Basic Text Structured Report" or "Secondary Capture Image" format depending on the user's selection.
Transfer Syntaxes to be Excluded (SCP)	SERVICE		Transfer Syntaxes can be excluded for all SOP Classes or for specific SOP Classes. Presentation Contexts for excluded Transfer Syntaxes in incoming Association Requests will be rejected.
Header Correction Ruleset (SCP)	SERVICE		The selected Header Correction Ruleset will be applied for DICOM Data received. Beside a default list of Header Correction Ruleset, the User can define own Header Correction Rulesets.
Series Complete Delay (SCP)	SERVICE	0	Delay between a Receive Job is finished, and the received series are considered as complete

6.2.9 Storage Commitment Service Configuration

Table 6.2-4 lists Storage Commitment Service configuration parameters:

Table 6.2-4: Storage Commitment Service Parameters

Local Configuration Parameters – Storage Commitment			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE	The machine name	
Called AE Title (SCP)	SERVICE	The machine name	
Port	SERVICE	5104	Value range: 1 – 65536
TLS-Secured Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Use encrypted DICOM communication for incoming connections	SERVICE	(not set)	
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Remote Configuration Parameters – Storage Commitment			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE		
Called AE Title (SCP)	SERVICE		
Port	SERVICE	5104	Value range: 1 – 65536
TLS-Secured Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Only allow encrypted DICOM communication for outgoing connections	SERVICE	(not set)	
Hostname	SERVICE		
IP Address	SERVICE		
Timeouts and Retries – Delay Time	SERVICE	10 Minutes	Value range: 0 – 14400 Minutes
Timeouts and Retries – Result Timeout	SERVICE	60 Minutes	Value range: 0 – 14400 Minutes

Timeouts and Retries – Number of Retries	SERVICE	1	Value range 1 – 100
Sending of N-Action - Bundled Call	SERVICE	ENABLED	This setting determines whether the system will send an N-Action for each object separately or bundled per transfer job.

6.2.10 Query/Retrieve Service Configuration

Table 6.2-5 lists Query/Retrieve Service configuration parameters:

Table 6.2-5: Query/Retrieve Service Parameters

Local Configuration Parameters – Query/Retrieve			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE	The machine name	
Called AE Title (SCP)	SERVICE	The machine name	
Port	SERVICE	104	Value range: 1 – 65536
TLS-Secured Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Use encrypted DICOM communication for incoming connections	SERVICE	(not set)	
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Remote Configuration Parameters – Query/Retrieve			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE		
Called AE Title (SCP)	SERVICE		
Port	SERVICE	5104	Value range: 1 – 65536
TLS-Secured Port	SERVICE	2762	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Only allow encrypted DICOM communication for outgoing connections	SERVICE	(not set)	
Hostname	SERVICE		
IP Address	SERVICE		

6.2.11 Print Management Service Configuration

Table 6.2-6 lists Print Management Service configuration parameters:

Table 6.2-6: Print Management Service Parameters

Local Configuration Parameters – Print			
Parameter	**Configurable**	**Default Value**	**Comments**
Calling AE Title (SCU)	SERVICE	The machine name	
Logical Name	SERVICE		If this is set, the user will see the Logical Name in the list of the Remote Nodes (otherwise the Host Name).
Location	SERVICE		
Only allow encrypted DICOM communication for outgoing connections	SERVICE	(not set)	
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Look Up Tables (LUT)	SERVICE		For every image type the user can select a Correction Look Up Table and a Density. The standard set of Look Up Tables can be extended by the consumer of <program>
Remote Configuration Parameters – Print			
Parameter	**Configurable**	**Default Value**	**Comments**
Called AE Title (SCP)	SERVICE		
Port	SERVICE	104	Value range: 1 – 65536
Logical Name	SERVICE		
Location	SERVICE		
Only allow encrypted DICOM communication for outgoing connections	SERVICE	(not set)	If set, the Local Node will only accept encrypted communication (TLS handshake).
Hostname	SERVICE		
IP Address	SERVICE		
Composing Parameter – Attached LUT Mode	SERVICE	LinearLut 12 bit support	Value range: LinearLut, BartenLut, CorrectionLut. For every LUT Mode the user can select 8 or 12 bit support
Composing Parameter – Illumination	SERVICE	2000 cd/m²	Value range: 1 – 10000 cd/m² This value can only be set, if the Attached LUT Mode is set to BartenLut.
Composing Parameter – Reflected Ambient Light	SERVICE	10 cd/m²	Value range: 0 – 100000 cd/m² This value can only be set, if the Attached LUT Mode is set to BartenLut.
Composing Parameter – Supported Films/Papers	SERVICE	(all selected)	The user can select, which Films and/or Papers are supported. For each format the width and height (both for Portrait and Landscape format) and the Medium (Paper, ColorPaper, ClearFilm, BlueFilm) can be selected.
Supported Mediums	SERVICE	ColorPaper selected	The user can select the Supported Media and for each one the Pixel Width and Height in µm, Min and Max Density and the Background Color (White or Black)
Timeout & Delay – Printer Status Polling Interval	SERVICE	300 Seconds	Value range: 60 – 300 Seconds
Timeout & Delay – Inactivity Timeout	SERVICE	60 Seconds	Value range: 5 – 180 Seconds

The application uses a configuration platform to define the properties of the connected DICOM SCP, e.g.:

- supported film sizes of the connected DICOM SCP
- supported film formats of the DICOM SCP

6.3 Configuration of DICOM Web Services

N/A

6.4 Configuration of Media Storage Service

Table 6.4-1 lists configuration parameters for the Media Storage service.

Table 6.4-1: Media Storage Service Parameters

Local Configuration Parameters - Media Storage Service			
Parameter	**Configurable**	**Default Value**	**Comments**
Default Media Compression	SERVICE	Priority 1: JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Priority 2: (not set) Priority 3: (not set)	The values can be selected from a list. All three values must be different or not set.

6.5 Configuration of Real Time Video Service

N/A

6.6 Configuration of Audit Trail - Syslog

Audit Trails can be created locally and remotely. The last one consists of sending the log records to an external server. The remote logging can be switched on or off. This does not affect the local logging behavior.

Table 6.6-1 lists configuration parameters for the Audit Trail Originator.

Table 6.6-1: Audit Trail Collector Parameters

Originator Audit Trail Message Transmission-SYSLOG Parameters			
Parameter	**Configurable**	**Default Value**	**Comments**
Host Name	SERVICE		This is the name of the *remote* host.
Port	SERVICE	0	
Protocol	SERIVCE	TCP	The possible values are: Secure TCP, TCP and UDP
Certificate Thumbprint	SERVICE		

7 Network and Media Communication Details

7.1 General

The cross interaction between the AEs is depicted in the diagrams below.

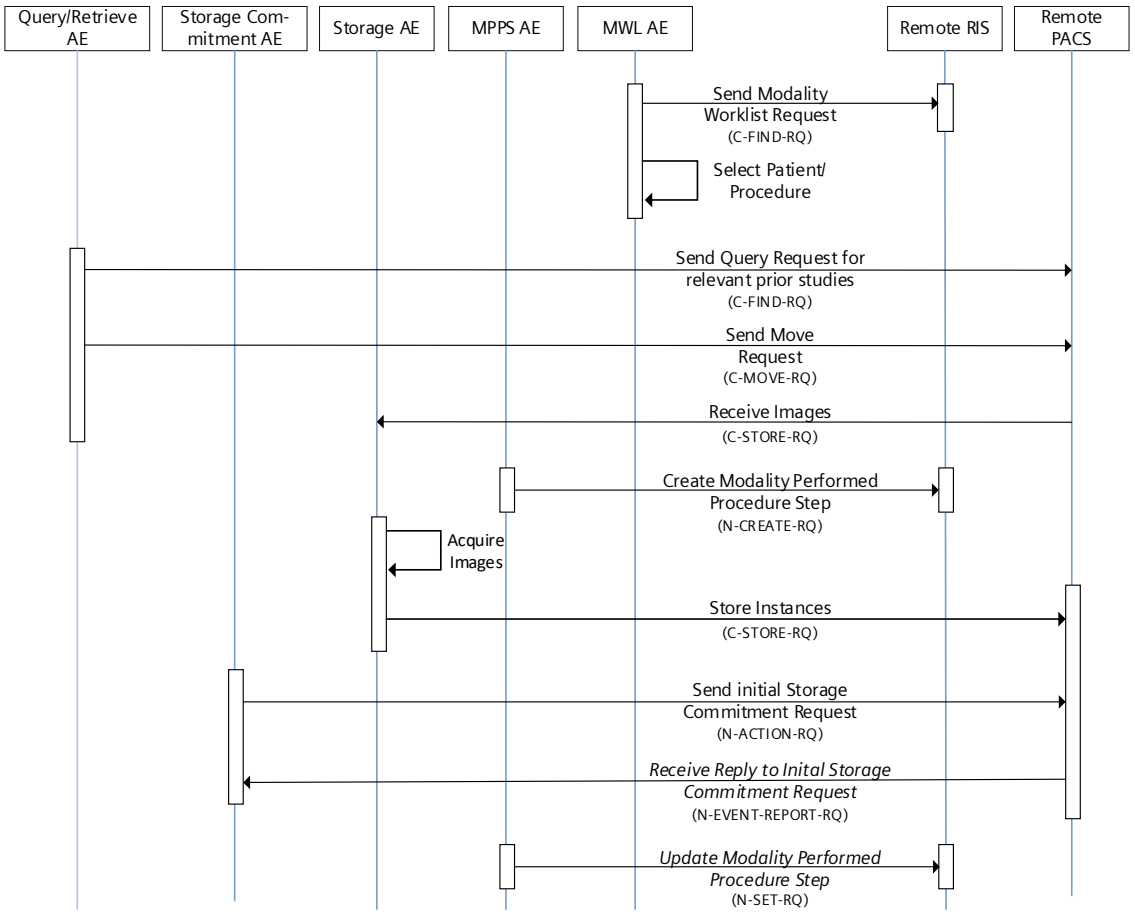


Figure 7.1-1: Real-World Activity and Cross AE interaction

7.1.1 Physical Network Interface

YSIO X.pree provides DICOM 3.0 TCP/IP network communication support as defined in Part 8 of the DICOM Standard. The network communication is independent from the physical medium over which TCP/IP executes; it inherits this from the Windows OS system upon which it executes.

7.1.2 IPv4 and IPv6 Support

IPv4 and IPv6 are supported. Regarding IPv6 please note, that the complete networking infrastructure in the hospital (firewalls, DNS-Servers, ...) must support IPv6 to get a functioning communication.

7.1.3 General Association Parameters

Table 7.1-1 lists Association parameters applicable to all AEs on the system.

Table 7.1-1: General Association Parameters

Type	Name	Value
Networking Services	DICOM Application Context Name	1.2.840.10008.3.1.1.1
	Implementation Class UID	1.3.12.2.1107.5.11.1
	Implementation Version Name	UIS_VA30
	PDU size	Default 32 kB
	Maximum PDU Length	512 kB
	ARTIM Timeout	30 seconds
	Maximum number of simultaneous Associations as Association Initiator	unlimited[1)]
	Maximum number of simultaneous Associations as Association Acceptor	12[2)]
	Maximum number of outstanding asynchronous Transactions – *only for Storage and only as SCU*	10
Media Services	File Meta Information Version	0001
	Implementation Class UID	1.3.12.2.1107.5.11.1
	Implementation Version Name	UIS_VA30

[1)] There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system.

[2)] The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

7.1.4 Common Real-World Activities

Since all AEs support the Verification SOP Class in their role (SCP, SCU or both), this document provides a single description for those in this section.

Furthermore, a brief description about the common aspects of the Association Acceptance Policies is presented.

The following sub-sections describe Real World Activities that are supported by all AEs defined in Section 7.2. The Sequencing of these common Real-World Activities is shown in Figure 7.1-2:

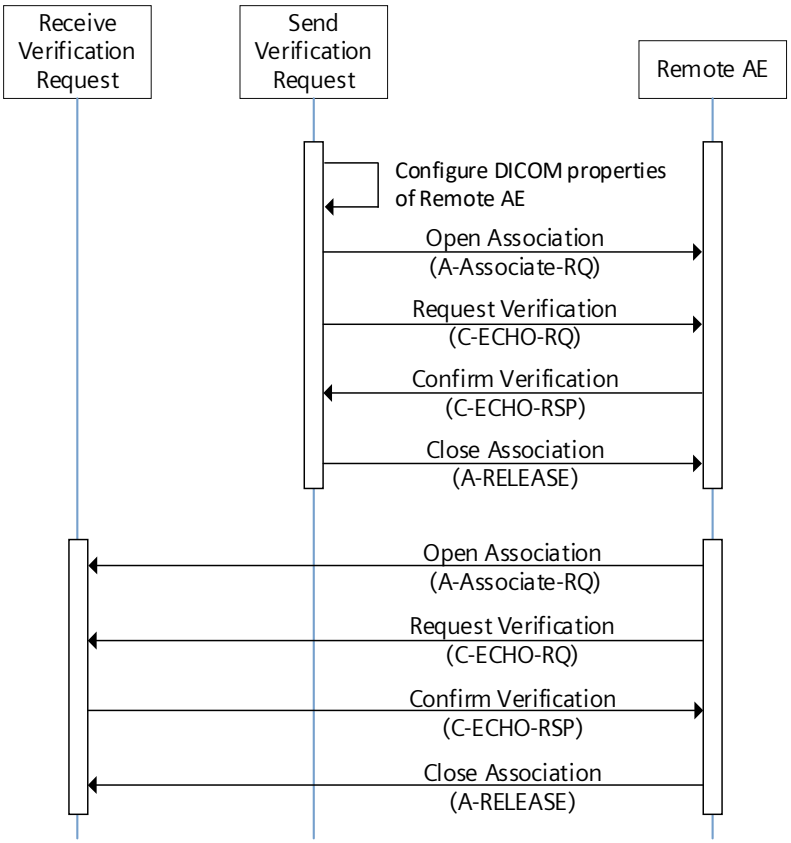


Figure 7.1-2:Common Real-World Activities

7.1.4.1.1 Association Initiation Policy

Based on the security settings for the Local DICOM Node and the configured Remote DICOM Nodes, a secure or an unsecure communication channel will be initialized. The connection request will be sent using this channel.

7.1.4.1.2 Real-World Activity "Send Verification Request"

YSIO X.pree serves as an SCU of the Verification Service Class. A C-ECHO-RQ is initiated by the Administrator Portal whenever "Verification" is requested. If an association to a remote Application Entity is successfully established, Verification with the configured AET is requested via the open association. The C-ECHO-RSP from the remote Application can only indicate a Success-status, according to the DICOM Standard. Thus, on receiving a C-ECHO-RSP in the limits of the Transfer Inactivity Timeout (see Table 6.1-1) from the configured AET, the Verification is regarded as successful.

7.1.4.1.3 Association Acceptance Policy

7.1.4.1.3.1 Based on the calling AE Title

The user can configure if YSIO X.pree should accept Association Requests from any calling AE Title or only from those belonging to configured Remote Nodes, called known AE Titles.

If only calls from known AE Titles are accepted, the network connection is established, and the calling AE Title can send the A-ASSOCIATE-RQ. YSIO X.pree will reject Association Requests coming from unknown AE Titles (A-ASSOCIATE-RJ, Result: permanent, Source: 1, Reason/Diag.: 3 - calling-AE-title-not-recognized).

If calls from any AE Titles are accepted, Association Requests from all calling AE Titles will be accepted (A-ASSOCIATE-AC).

7.1.4.1.3.2 Based on the security settings for the Local and Remote DICOM Nodes

The user can impose via configuration secure and encrypted communication. This can affect only one Remote Node, which means, only the communication with the AE Title belonging to the respective Remote Node must be secure and encrypted.

If the Remote Node tries to open an unsecure and unencrypted network connection, the connection will be rejected. In this case no DICOM Messages are going to be exchanged.

The user can also impose via configuration that YSIO X.pree only accepts secure connections. In this case every unsecure and unencrypted connection attempt, will be rejected, before any DICOM Message can be sent.

In this case, the setting of accepting all calling AE Titles, due to technical reasons, ineffective. Only Association Requests from known Calling AE Titles will be accepted.

7.1.4.1.4 Real-World Activity “Receive Verification Request”

YSIO X.pree serves as an SCP of the Verification Service Class. If the Verification SCP accepts an association, it will respond to C-ECHO-RQ. If the Called AE Title does not match any pre-configured AE Title shared by SCP, the association will be rejected.

The C-ECHO-RSP always indicates, as required in the DICOM Standard, a successful operation.

7.2 Specifications

This section outlines the specifications for each of the Application Entities that are part of YSIO X.pree.

7.2.1 Storage Application Entity

7.2.1.1 Sequencing of Real-World Activities for Storage AE

Figure 7.2- shows the Sequencing of the Real-World Activities for the Storage AE.

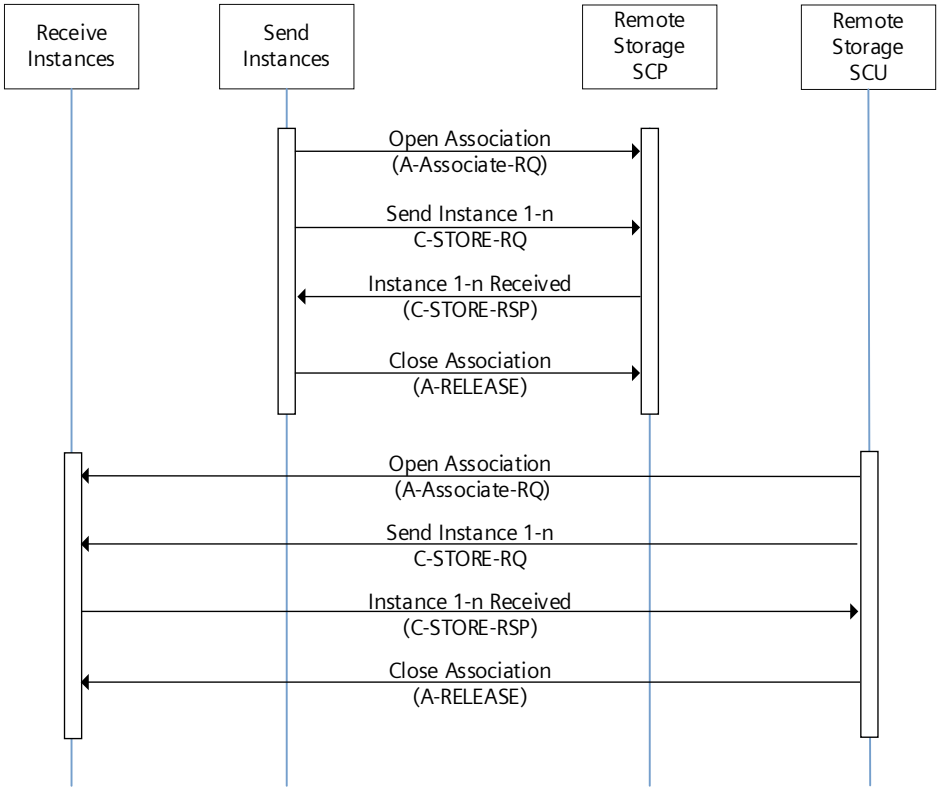


Figure 7.2-1: Real-World Activities for Storage AE

As a SCU, YSIO X.pree starts sending the selected instances after the association has been accepted. After all instances are sent, YSIO X.pree closes the association.

As a SCP, YSIO X.pree starts receiving instances in the negotiated transfer syntax, after the association has been accepted.

In addition to the Real-World Activities described in this Section, YSIO X.pree also supports all Real-World Activities listed in Section 7.1.4.

7.2.1.2 Association Parameters of Storage AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.1.3 Transfer Syntax Selection Policies

YSIO X.pree offers a basic option for Transfer Syntax selection, for favoring uncompressed formats (for low CPU load) or compressed format (for low network load). A certain selection does not lead in a deterministic manner to the usage of a compressed or uncompressed Transfer Syntax, since before every transfer a Transfer Syntax Negotiation takes place.

Beside this option it is possible to exclude Transfer Syntaxes for both SCP and SCU site. The exclusion can be a general one (excluding certain Transfer Syntax or Transfer Syntaxes for all SOP Classes) or a specific one (excluding certain Transfer Syntaxes for specific SOP Classes). This can also be configured on the Administration Portal.

The exclusion of Transfer Syntaxes is deterministic. They will not be offered (SCU side) or accepted (SCP side) during the Transfer Syntax Negotiation.

All the supported Transfer Syntaxes (see

Table 1.1-2: Supported Transfer Syntaxes) can be excluded both generally and for specific SOP Classes. All non-media related SOP Classes from Table 1.1-1: Storage SOP Classes can be used as in the specific Transfer Syntax exclusion.

Using the Transfer Syntax exclusion compression can be enforced by excluding all the Transfer Syntaxes, except for the requested compressed one.

This is a setting, that can be applied to every Remote Node, both on SCU and SCP side.

An instance will be JPEG lossless compressed only if it fulfills the following criteria:

- Is an image and not already compressed
- Photometric Interpretation (0028,0004) is either MONOCHROME1, MONOCHROME2, RGB, YBR_FULL
- Bits Allocated (0028,0100) equal to '16 or '8'
- Bits Stored (0028,0101) equal to '12' or '8'
- High Bit (0028,0102) equal to Bits Stored (0028,0101) – 1
- Pixel Representation (0028,0103) equal to '0'

An instance will be JPEG lossy compressed during transfer only if the following criteria is fulfilled:

- Is an image
- Photometric Interpretation (0028,0004) is either MONOCHROME1, MONOCHROME2 or RGB, YBR_FULL, YBR_FULL_244
- Bits Allocated (0028,0100) equal to '16' or '8'
- Bits Stored (0028,0101) equal to '12' or '8'
- High Bit (0028,0102) equal to Bits Stored (0028,0101) – 1
- Pixel Representation (0028,0103) equal to '0'
- Only lossy transfer syntaxes are supported (Implicit Little Endian is not supported) at the remote side

An instance will be JPEG 2000 lossless compressed only if it fulfills the following criteria:

- Is an image and not already compressed
- Photometric Interpretation (0028,0004) is either MONOCHROME, RGB, YBR_FULL or YBR_FULL_422
- Bits Allocated (0028,0100) equal to '16' or '8'

An instance will be RLE lossless compressed only if it fulfills the following criteria:

- Is an image and not already compressed
- Photometric Interpretation (0028,0004) is MONOCHROME, RGB, YBR_FULL or RGB
- Bits Allocated (0028,0100) '8' or '16' for MONOCHROME, '24' for other interpretations

An instance will be JPEG 2000 lossy compressed during transfer only if the following criteria is fulfilled:

- Is an image
- Photometric Interpretation (0028,0004) is MONOCHROME, YBR_FULL or RGB
- Bits Stored (0028,0101) equal to '12' or '8'
- Only lossy transfer syntaxes are supported (Implicit Little Endian is not supported) at the remote side

7.2.1.4 Association Initiation

This section details the Association policies of the Storage Application Entity when it is initiating an Association.

For general information regarding the association initiation policies please see chapter 7.1.4.1.1.

7.2.1.4.1 Real-World Activity "Send Verification Request"

The Storage AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.2

7.2.1.4.2 Real-World Activity “Send Instances”

The Storage SCU of is triggered by the transfer job queue or by an external retrieve request. An association request is sent to the Remote Storage SCP. One Presentation Context is proposed for each SOP Class/Transfer Syntax combination. For details on the selection of the actual transfer syntax among the ones accepted by the Remote Storage SCP, refer to Section 7.2.1.3). Upon successful negotiation of a Presentation Context, the transfer is started. All Instances will be transferred sequentially on the same open association. If no suitable presentation context is found, the association will be aborted.

YSIO X.pree provides an automated retry mechanism, where the number of retries and the times between the retries can be configured.

7.2.1.4.3 Extended Negotiation

The Extended Negotiation parameters for all services that are supported by the Application Entity for the Real-World Activity Send Instances are described in Table 7.2-1: Extended Negotiation for Send Instances of Storage AE - Association Initiation.

Table 7.2-1: Extended Negotiation for Send Instances of Storage AE - Association Initiation

SOP Class	Extended Negotiation	Support	Requested Value
Storage			
Applicable to all storage SOP Classes listed under Section 5.	Level of support	N	
	Level of Digital Signature support	N	
	Element Coercion	N	

7.2.1.4.4 Role Negotiation

N/A

7.2.1.5 Association Acceptance

This section details the Association policies of the Application Entity when it is acceptor for an Association.

For general information regarding the association acceptance policies please see chapter 7.1.4.1.3.

7.2.1.5.1 Real-World Activity “Receive Verification Request”

The Storage AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.4.

7.2.1.5.2 Real-World Activity “Receive Instances”

The storage SCP accepts incoming C-Store Request from any configured AE Title, receives supported objects transmitted on that association and stores them in the local database.

Upon receiving an instance, YSIO X.pree returns the status “SUCCESS” after a minimal image header validation has been performed. If passed, the instance is written to disk using either the Explicit Little Endian format or in the compression format received.

The following header attributes must be available and filled:

- SOP Class UID - (0008,0016),
- SOP Instance UID - (0008,0018)
- Study Instance UID - (0020,000D),
- Series Instance UID - (0020,000E)
- Number of Frames - (0028,0008), applies for multi frame images only and
- Rows – (0028,0010).

Note that depending on the system configuration, a status of SUCCESS does not necessarily guarantee that the instances and header information are stored in the local database.

7.2.1.5.3 Extended Negotiation

The Extended Negotiation parameters for all services that are requested by the Application Entity for the Real-World Activity "Receive Instances" are described in Table 7.2-2: Extended Negotiation for Receive Instances of Storage AE - Association Acceptance.

Table 7.2-2: Extended Negotiation for Receive Instances of Storage AE - Association Acceptance

SOP Class	Extended Negotiation	Support	Requested Value
Storage			
Applicable to all storage SOP Classes listed under Section 1.1.	Level of support	Y	0
	Level of Digital Signature support	Y	0
	Element Coercion	Y	0

7.2.2 Storage Commitment Application Entity

7.2.2.1 Sequencing of Real-World Activities for Storage Commitment AE

Figure 7.2-2 shows the Sequencing of the Real-World Activities for the Storage Commitment AE.

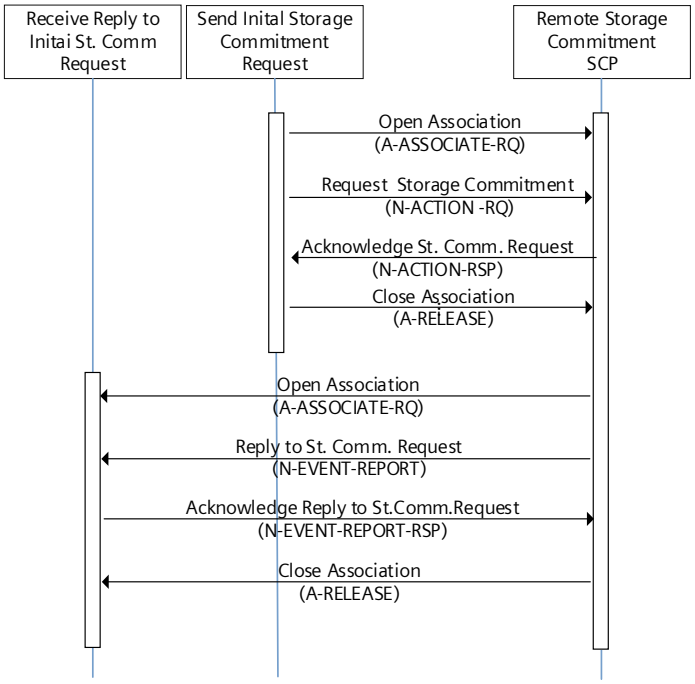


Figure 7.2-2: Real-World Activities for Storage Commitment AE

Every Storage Commitment process starts with sending Data to a Remote DICOM Node. If the respective Remote DICOM Node is configured as Archive (PACS), the sender will ask for confirmation of the storage (N-ACTION-RQ). Depending on the Storage Commitment setting for the Remote Node, this can be sent for all instances once (Bundled Call) or for each instance separately. The Remote Node will answer accordingly.

If the request to confirm the long-term storage (N-EVENT-REPORT-RQ) is sent immediately (within 3 seconds) it will be received on the same association. Otherwise, the Remote Storage Commitment SCP must open the Association to send the request.

In addition to the Real-World Activities described in this Section, YSIO X.pree also supports all Real-World Activities listed in Section 7.1.4.

7.2.2.2 Association Parameters of Storage Commitment AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.2.3 Association Initiation

This section details the Association policies of the Storage Commitment Application Entity when it is initiating an Association.

For general information regarding the association initiation policies please see chapter 7.1.4.1.1.

7.2.2.3.1 Real-World Activity “Send Verification Request”

The Storage Commitment AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.2

7.2.2.3.2 Real-World Activity “Send Initial Storage Commitment Request”

YSIO X.pree serves as an SCU of the Storage Commitment Service Class. After successful transfer of DICOM Instances to a configured Archive node, YSIO X.pree initiates a confirmation request (N-ACTION-RQ). Storage Commitment is supported for all Storage SOP Classes listed in Table 1.1-1.

7.2.2.3.3 Extended Negotiation

There is no extended negotiation for Storage Commitment Push Model SOP Class.

7.2.2.3.4 Role Negotiation

N/A

7.2.2.4 Association Acceptance

This section details the Association policies of the Application Entity when it is acceptor for an Association.

For general information regarding the association acceptance policies please see chapter 7.1.4.1.3.

7.2.2.4.1 Real-World Activity “Receive Verification Request”

The Storage Commitment AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.4.

7.2.2.4.2 Real-World Activity “Receive Reply to Initial Storage Commitment Request”

YSIO X.pree has a configurable expiration timeout for the Transaction UID. By default, the Transaction UID expires 60 minutes.

7.2.2.4.3 Extended Negotiation

There is no extended negotiation for Storage Commitment Push Model SOP Class.

7.2.2.4.4 Transfer Syntax Selection Policies

This section describes the Transfer Syntax preference when there are multiple Transfer Syntaxes for a SOP class provided by the Association initiator for Real-World Activity “*Receive Reply to Initial Storage Commitment Request* of Storage Commitment AE of the system.

Table 7.2-3: Transfer Syntax Selection Preference Order for the Storage Commitment AE for Receive Reply to Initial Storage Commitment Request

Preference Order	Transfer Syntax	UID	Comments
1	Explicit VR Little Endian	1.2.840.10008.1.2.1	
2	Implicit VR Little Endian	1.2.840.10008.1.2	
3	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	

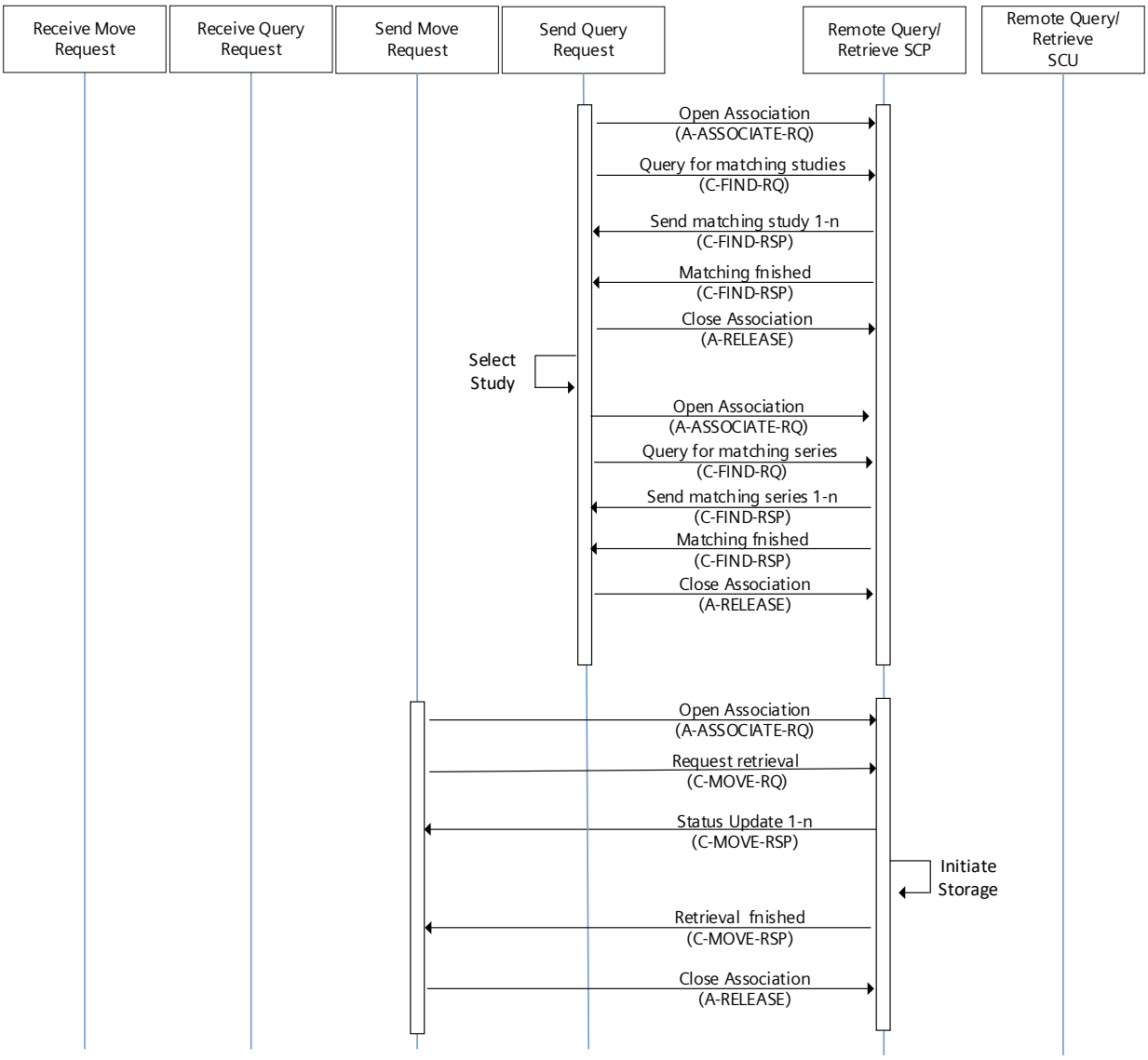
7.2.2.4.5 Role Negotiation

YSIO X.pree supports the reverse role negotiation. It accepts incoming N-EVENT-REPORT-RQ as SCU, if they do not arrive on the same association as the N-ACTION-RQ.

7.2.3 Query/Retrieve Application Entity

7.2.3.1 Sequencing of Real-World Activities for Query/Retrieve AE

Figure 7.2-3 shows the Sequencin0g of the Real-World Activities for the Query/Retrieve AE.



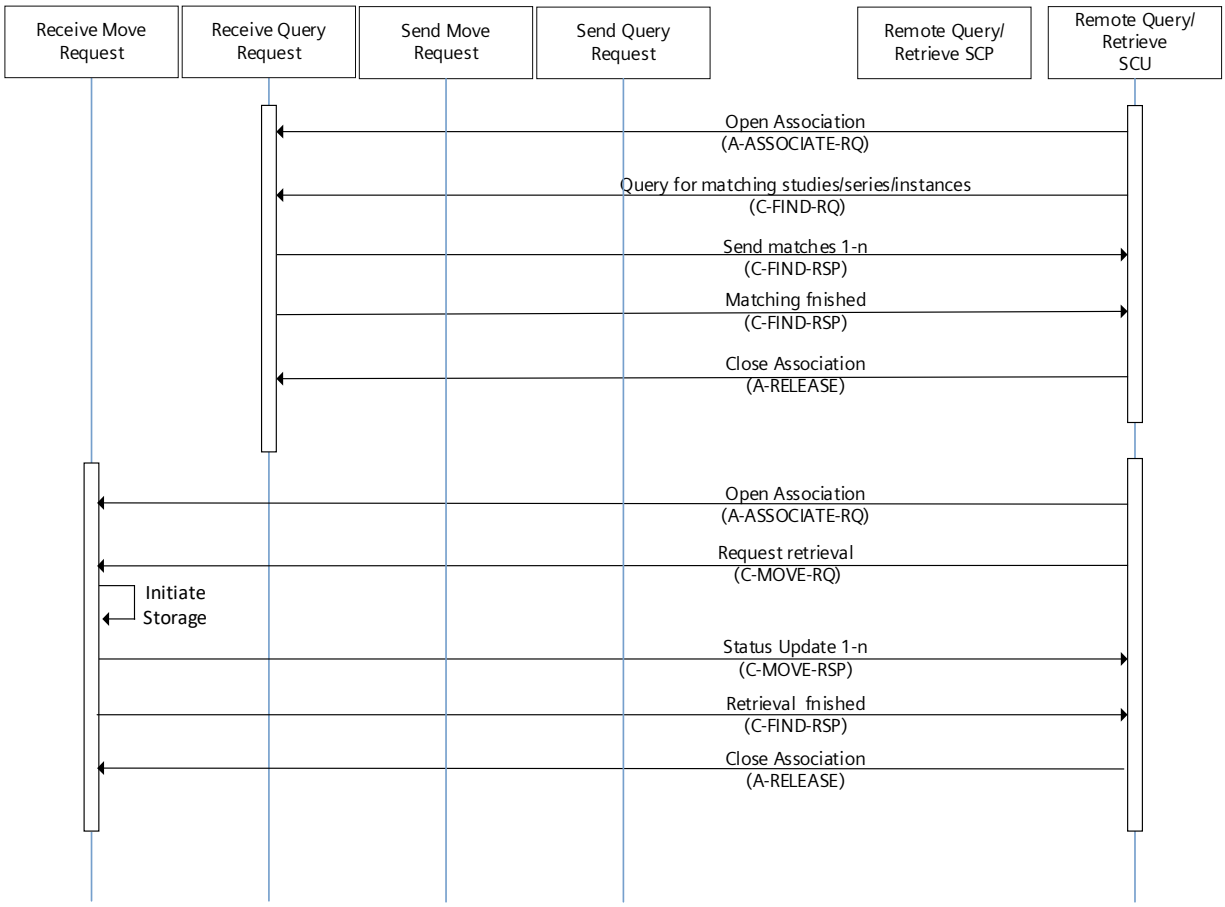


Figure 7.2-3: Real-World Activities for Query/Retrieve AE

YSIO X.pree provides a standard GUI for Query/Retrieve. In the first step the Remote Node must be selected. The Studies found based on the search criteria entered by the user will be listed. If the user chooses a study, each one of its series will be also listed. The user can select a study or a series to retrieve. Selecting a series will retrieve its study too.

As an SCU YSIO X.pree opens the association using the negotiated FIND Study Root Query/Retrieve Information Model. Afterwards it sends a C-FIND-RQ including query keys on the study level as provided by the user and waits for the matches in the C-FIND-RSP. In subsequent associations the system will issue C-FIND-RQ to retrieve the Series of the selected study.

After the system finalized all queries and closed the association for querying, the user makes his selection for retrieval. YSIO X.pree opens an association and issues a C-MOVE-RQ. After receiving a final status code, the association is closed.

Receiving the Instances via C-STORE is performed by the Storage Application Entity (see section 7.2.1.5).

As an SCP YSIO X.pree accepts association requests for Study Root, Patient Root and Patient/Study Only Query Information Models. Upon receiving a C-FIND-RQ it returns matches for the provided keys using the C-FIND-RSP messages. Queries on all Levels (Study, Series and Instance) are processed and answered. After all matches have been communicated a C-FIND-RSP with a status of SUCCESS is sent.

Upon receiving a C-MOVE-RQ YSIO X.pree will trigger the Storage Application Entity to send the requested Instance(s).

In addition to the Real-World Activities described in this Section, YSIO X.pree also supports all Real-World Activities listed in Section 7.1.4.

7.2.3.2 Association Parameters of Query/Retrieve AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.3.3 Association Initiation

This section details the Association policies of the Query/Retrieve Application Entity when it is initiating an Association.

For general information regarding the association initiation policies please see chapter 7.1.4.1.1.

7.2.3.3.1 Real-World Activity "Send Verification Request"

The Query/Retrieve AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.2

7.2.3.3.2 Real-World Activity "Send Query Request"

YSIO X.pree serves as an SCU for the SOP Class Study Root Q/R Information Model – FIND SOP Class.

Using the attributes specified by the user as Query Keys (in accordance with the query model) the Query SCU initiates a C-FIND-RQ and displays the responses to the user.

7.2.3.3.3 Extended Negotiation

The Extended Negotiation parameters for all services that are supported by the Application Entity for the Real-World Activity "Send Query Request" are described in Table 7.2-4.

Table 7.2-4: Extended Negotiation for Send Query Request of Query/Retrieve AE Association Initiation

SOP Class	Extended Negotiation	Support	Requested Value
Query			
Applicable to all Query Retrieve – FIND SOP Classes mentioned in Section 5.	Relational queries	Y	1
	Fuzzy semantic matching of person names	N	

7.2.3.3.4 Role Negotiation

N/A

7.2.3.3.5 Real-World Activity "Send Move Request"

YSIO X.pree serves as an SCU for the SOP Class Study Root Q/R Information Model – FIND SOP Class to retrieve imaging objects.

7.2.3.3.6 Extended Negotiation

Extended Negotiation is not supported by the Application Entity for the Real-World Activity "Send Move Request".

7.2.3.3.7 Role Negotiation

N/A

7.2.3.4 Association Acceptance

This section details the Association policies of the Application Entity when it is acceptor for an Association.

For general information regarding the association acceptance policies please see chapter 7.1.4.1.3.

7.2.3.4.1 Real-World Activity "Receive Verification Request"

The Query/Retrieve AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.4.

7.2.3.4.2 Real-World Activity "Receive Query Request"

YSIO X.pree serves as an SCP for the Study Root, Patient Root and Patient Study Only Q/R Information Model – FIND SOP Classes.

Using the attributes specified by the user as Query Keys (in accordance with the query model) the Query SCP accepts a C-FIND-RQ and provides the responses for the requesting node.

7.2.3.4.3 Extended Negotiation

The Extended Negotiation parameters for all services that are requested by the Application Entity for the Real-World Activity "Receive Query Request" are described in Table 7.2-5.

Table 7.2-5: Extended Negotiation for Receive Query Request of Query/Retrieve AE - Association Acceptance

SOP Class	Extended Negotiation	Support	Requested Value
Query			
Applicable to all Query Retrieve – FIND SOP Classes mentioned in Section 5.	Relational queries	Y	1
	Fuzzy semantic matching of person names	N	

7.2.3.4.4 Transfer Syntax Selection Policies

This section describes the Transfer Syntax preference when there are multiple Transfer Syntaxes for a SOP class provided by the Association initiator for Real-World Activity "Receive Query Request" of the system.

Table 7.2-6: Transfer Syntax Selection Preference Order – Non-Image SOP Classes for Query/Retrieve AE

Preference Order	Transfer Syntax	UID	Comments
1	Explicit VR Little Endian	1.2.840.10008.1.2.1	
2	Implicit VR Little Endian	1.2.840.10008.1.2	
3	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	

7.2.3.4.5 Role Negotiation

N/A

7.2.3.4.6 Real-World Activity "Receive Move Request"

YSIO X.pree serves as an SCP for the SOP Class Study Root Q/R Information Model – MOVE SOP Class.

The C-MOVE-RQ is used to retrieve the selected imaging objects. The Retrieve AE supports the query model Study Root only.

7.2.3.4.7 Extended Negotiation

Extended Negotiation parameters for the Real-World Activity "Receive Move Request" are note supported.

7.2.3.4.8 Transfer Syntax Selection Policies

This section describes the Transfer Syntax preference when there are multiple Transfer Syntaxes for a SOP class provided by the Association initiator for Real-World Activity "Receive Move Request" of the system.

Table 7.2-7: Transfer Syntax Selection Preference Order – Non-Image SOP Classes for Query/Retrieve AE

Preference Order	Transfer Syntax	UID	Comments
1	Explicit VR Little Endian	1.2.840.10008.1.2.1	
2	Implicit VR Little Endian	1.2.840.10008.1.2	
3	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	

7.2.3.4.9 Role Negotiation

N/A

7.2.4 Modality Worklist Application Entity

7.2.4.1 Sequencing of Real-World Activities for Modality Worklist AE

Figure 7.2-4 shows the Sequencing of the Real-World Activities for the Modality Worklist AE.

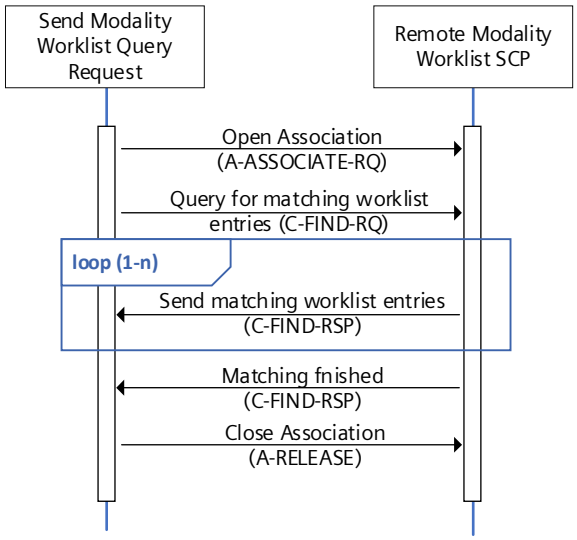


Figure 7.2-4: Real-World Activities for Modality Worklist AE

As a SCU, YSIO X.pree opens an association for querying the Modality Worklist by issuing C-FIND-It receives the matching worklist entries in a C-FIND-RSP with a "Pending status". Matching worklist entries will be displayed in the patient browser. Upon receiving a final a C-FIND-RSP with A "Success status" the association is closed.

For every node can be configured which events should trigger the sending of the message (scheduled or unscheduled/locally created). The user can also configure if YSIO X.pree should send progress notifications or a message on completion.

7.2.4.2 Association Parameters of Modality Worklist AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.4.3 Association Initiation

This section details the Association policies of the Modality Worklist Application Entity when it is initiating an Association.

For general information regarding the association initiation policies please see chapter 7.1.4.1.1.

7.2.4.3.1 Real-World Activity "Send Verification Request"

The Modality Worklist AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.2

7.2.4.3.2 Real-World Activity "Send Modality Worklist Request"

YSIO X.pree initiates a Modality Worklist query either in regular configurable time intervals or when triggered manually by the user.

7.2.4.3.3 Extended Negotiation

The Extended Negotiation parameters for all services that are supported by the Application Entity for the Real-World Activity "Send Modality Worklist Request" are described in Table 7.2-8.

Table 7.2-8: Extended Negotiation for Send Modality Worklist Request of the Modality Worklist AE - Association Initiation

SOP Class	Extended Negotiation	Support	Requested Value
Modality Worklist			
Modality Worklist Information Model – FIND	Fuzzy semantic matching of person names	N	

7.2.5 Modality Performed Procedure Step Application Entity

7.2.5.1 Sequencing of Real-World Activities for Modality Performed Procedure Step AE

Figure 7.2-5 shows the Sequencing of the Real-World Activities for the Modality Performed Procedure Step AE.

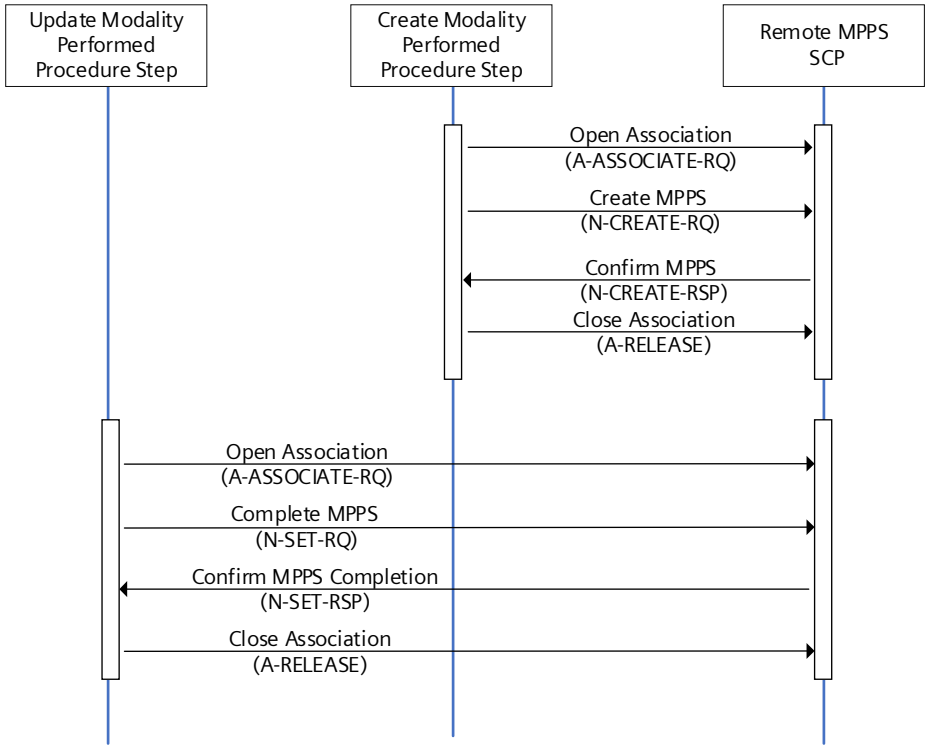


Figure 7.2-5: Real-World Activities for Modality Performed Procedure Step AE

7.2.5.2 Association Parameters of Modality Performed Procedure Step AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.5.3 Association Initiation

This section details the Association policies of the MPPS Application Entity when it is initiating an Association.

For general information regarding the association initiation policies please see chapter 7.1.4.1.1.

7.2.5.3.1 Real-World Activity "Send Verification Request"

The Modality Performed Procedure Step AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.2

7.2.5.3.2 Real-World Activity "Start Procedure Step"

YSIO X.pree serves as an SCU of the Modality Performed Procedure Step Service Class. An N-CREATE-RQ is sent when the first radiation was released for a procedure step and a final N-SET-RQ is sent when the examination is closed. YSIO X.pree can also discontinue a procedure step without radiation on user request.

7.2.5.3.3 Transfer Syntax Selection Policies

This section describes the Transfer Syntax preference when there are multiple Transfer Syntaxes for a SOP class provided by the Association initiator for Real-World Activity "Send Instances" of the system.

Table 7.2-9: Transfer Syntax Selection Preference Order –MPPS AE

Preference Order	Transfer Syntax	UID	Comments
1	Explicit VR Little Endian	1.2.840.10008.1.2.1	
2	Implicit VR Little Endian	1.2.840.10008.1.2	
3	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	

7.2.6 Print Application Entity

7.2.6.1 Sequencing of Real-World Activities for Print AE

Figure 7.2-6 shows the Sequencing of the Real-World Activities for the Print AE.

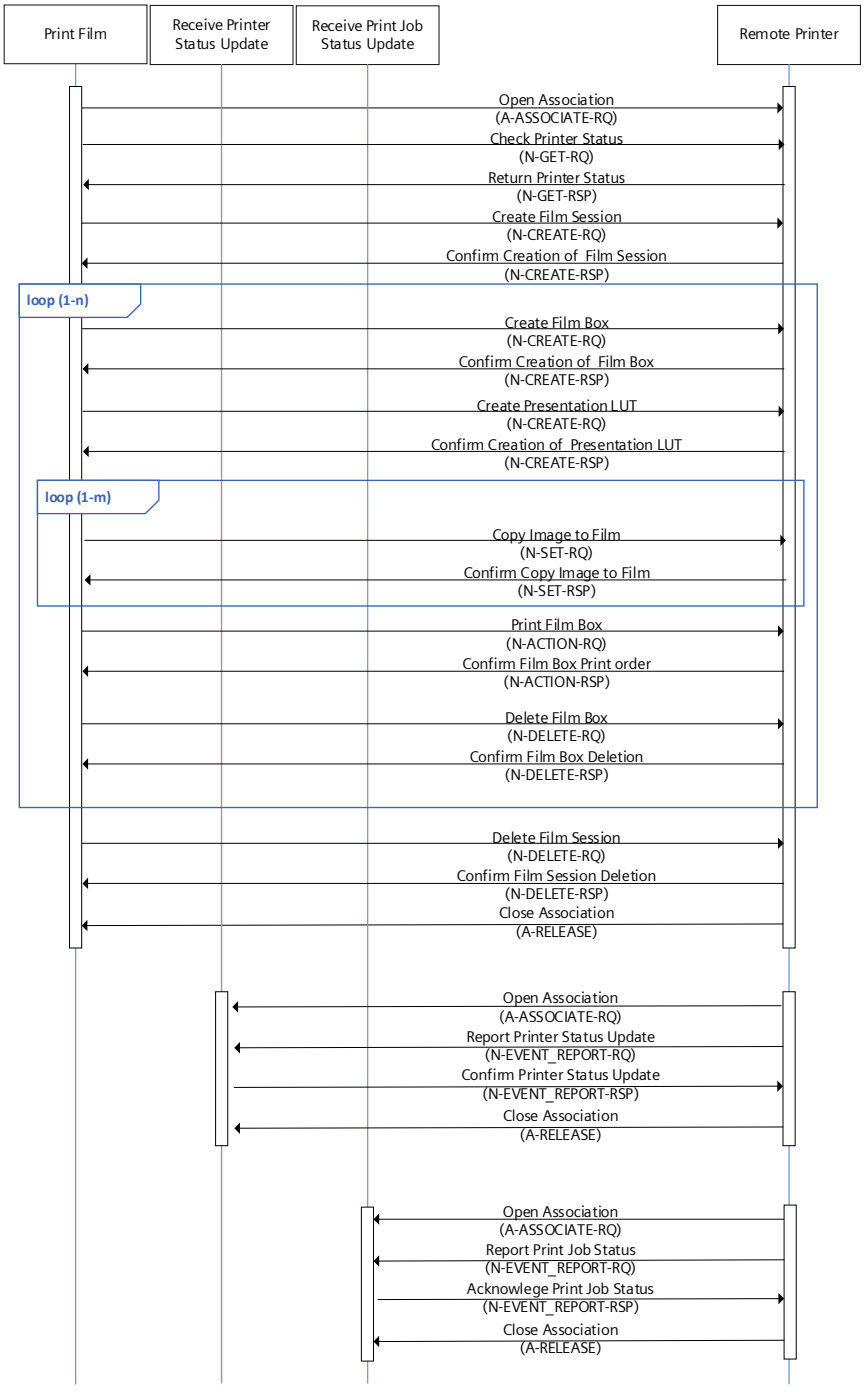


Figure 7.2-6: Real-World Activities for Print AE

As an SCU YSIO X.pree starts the Print Film activity after checking the Printer Status using the N-GET-RQ of the Printer SOP Class. If the printer is alive, a film session will be created using the N-CREATE-RQ of the Basic Film Session SOP Class. Within the created film session all necessary films will be created using the N-CREATE-RQ of the Basic Film Box SOP Class. Afterwards all images will be copied to the film using the N-SET-RQ of either the Basic Grayscale Image Box or the Basic Color Image Box. It is possible to set a Presentation LUT for each Film using the N-CREATE-RQ of the Presentation LUT SOP

Class. After the print job has been finished, all film boxes and the film session will be deleted using the N-DELETE-RQ of the respective SOP Class.

Furthermore YSIO X.pree can asynchronously receive N-EVENT-REPORT- RQs of either the Printer SOP Class or of the Print Job SOP Class in order receive updates about the printer status or a print job status.

7.2.6.2 Association Parameters of Print AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.6.3 Association Initiation

This section details the Association policies of the Print Application Entity when it is initiating an Association.

For general information regarding the association initiation policies please see chapter 7.1.4.1.1.

7.2.6.3.1 Real-World Activity “Send Verification Request”

The Print AE supports the Verification SOP Class. For further details please see chapter 7.1.4.1.2

7.2.6.3.2 Real-World Activity “Print Film”

Whenever a film-sheet is prepared by the user, it is forwarded to the Printer Job queue. As soon as the associated Printer device is available the job is activated, and an association is established.

After the film sheet is internally processed, converted to a STANDARD\1,1 layout and the page image is sent to the printer, the status is controlled by awaiting any N-EVENT-REPORT message throughout the transfer until the last image or film-sheet is sent.

When all Image Boxes (including parameters) for the film-sheets have been set, the YSIO X.pree print manager will issue an N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

If the response from the remote application contains a status other than Success or Warning the printing is stopped and the job status is set to Aborted.

7.2.6.4 Association Acceptance

This section details the Association policies of the Application Entity when it is acceptor for an Association.

For general information regarding the association acceptance policies please see chapter 7.1.4.1.3.

7.2.6.4.1 Real-World Activity “Receive Printer Status Update”

Receiving the N-EVENT- REPORT-RQ from a printer, YSIO X.pree is asynchronously informed about the status of the printer.

The status information received in this way will be forwarded to the Printing Service implementation. Is a Print Job in progress and the received status indicates an error, the current job will be cancelled.

The status information is set for the printer in use. This is visible for the user on the printing GUI.

7.2.6.4.2 Real-World Activity “Receive Printer Job Status Update”

Receiving the N-EVENT- REPORT-RQ from a printer YSIO X.pree is asynchronously informed about the status of a print job for monitoring its progress.

The status information received in this way will be forwarded to the Printing Service implementation.

The status information is set for the current job. This is visible for the user on the printing GUI.

7.2.6.4.3 Extended Negotiation

N/A

7.2.6.4.4 Role Negotiation

YSIO X.pree supports the reverse role negotiation of the Printer SOP Class and of the Print Job SOP Class. It accepts incoming N-EVENT-REPORT-RQ as SCU.

7.2.7 Media Storage Application Entity

7.2.7.1 Sequencing of Real-World Activities

Figure 7.2-7 shows the Sequencing of the Real-World Activities for the Media Storage AE.

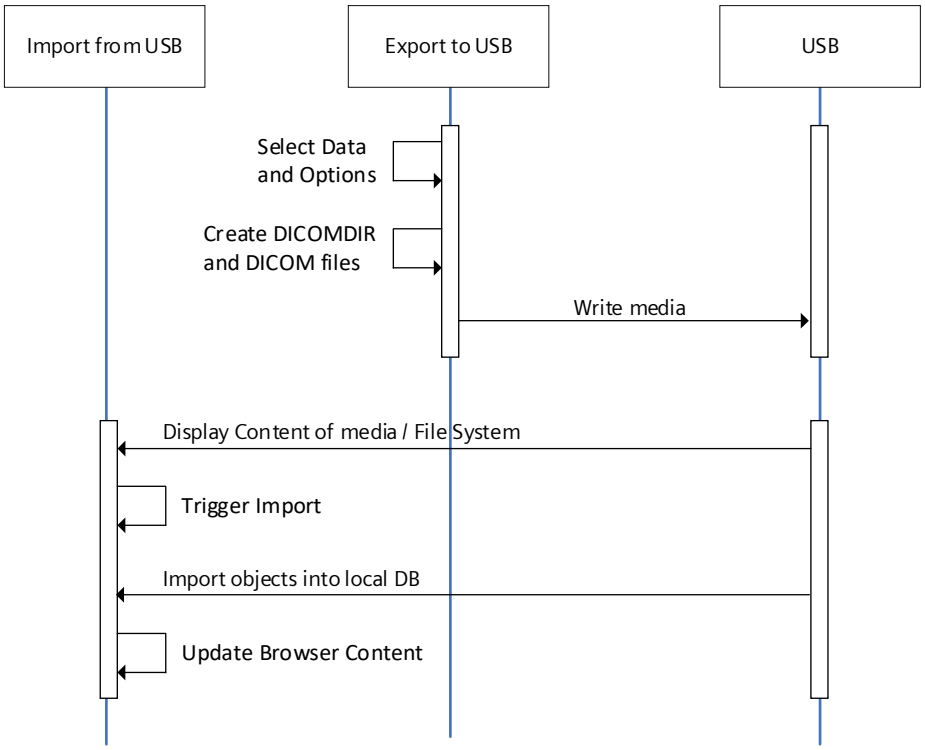


Figure 7.2-7: Real-World Activities for Media Storage AE

As a FSC, YSIO X.pree first creates a DICOMDIR from the selected data on the local hard disk. After that the data is copied to the target device.

7.2.7.2 Media Interchange

7.2.7.2.1 Real-World Activity “Browse Directory Information”

YSIO X.pree acts as FSR using the interchange option when requested to read the media directory.

YSIO X.pree will read the DICOMDIR and insert those directory entries that are valid for the application profiles supported, into a local database. The database then is used for browsing media contents.

7.2.7.2.2 Real-World Activity “Import into Application”

YSIO X.pree acts as FSR using the interchange option when requested to read SOP Instances from the medium into the application.

The SOP Instance selected from the media directory will be copied into the running Application. Only SOP Instances, that are valid for the application profile supported and supported by YSIO X.pree, can be retrieved from media.

7.2.7.2.3 Real-World Activity "Export to local Archive Media"

YSIO X.pree acts as FSU (for media with existing DICOM file-set) or FSC (media not initialized) using the interchange option when requested to copy SOP Instances from the local storage to local Archive Medium.

The activity as FSU is only possible for non-optical storage devices.

Using the Application Profiles supporting compression (AUG-GEN-USB-J2K, STD-GEN-USB-J2K) the following Transfer Syntaxes are supported:

Table 7.2-10: Transfer Syntaxes for USB-J2K profiles

UID value	Transfer Syntax	Image Objects	Non-Image Objects
1.2.840.10008.1.2.1	Explicit Value Representation Little Endian native	yes	yes
1.2.840.10008.1.2.4.50	JPEG Baseline (Process 1) lossy com-pressed	yes	no
1.2.840.10008.1.2.4.51	JPEG Extended (Process 2 & 4) lossy compressed	yes	no
1.2.840.10008.1.2.4.70	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) lossless compressed	yes	no
1.2.840.10008.1.2.4.90	JPEG 2000 Image Compression (Loss-less Only) compressed	yes	no
1.2.840.10008.1.2.4.91	JPEG 2000 Image Compression lossy compressed	yes	no
1.2.840.10008.1.2.5	RLE Lossless compressed	yes	no

Using the Application Profiles that do not support compression (AUG-GEN-USB, STD-GEN-USB) only Explicit Value Representation Little Endian (1.2.840.10008.1.2.1) is supported.

7.3 Status Codes

The following sections describe the Status Codes supported by the system for each implemented service as well as the reason for issuing specific Status codes respectively the associated behavior when receiving it.

7.3.1 General AE Communication and Failure Behavior and Handling

7.3.1.1 Communication Failure Behavior as Association Initiator

Table 7.3-1 describes behavior of the AE when a communication failure occurs when it initiated an Association.

Table 7.3-1: DICOM Communication Failure Behavior as Association Initiator

Failure	Failure Behavior
Timeout	The command is marked as failed. The reason is logged and reported to the user.
Association aborted	The command is marked as failed. The reason is logged and reported to the user.
Network Disconnect	The command is marked as failed. The reason is logged and reported to the user.

7.3.1.2 Communication Failure Handling as Association Acceptor

Table 7.3-2 describes how the AE responds when it receives an Association request that leads to failure in communication.

Table 7.3-2: DICOM Communication Failure Handling as Association Acceptor

Exception	Failure response
Failure during processing of Association request	The command is marked as failed. The reason is logged and reported to the user.
Unrecognized Called AE	AE responds with A-ASSOCIATE reject (Calling AE title not recognize, Reason Code 03) It is possible to configure YSIO X.pree in such a way, that all AE Titles are accepted. Is this mode set, the association requests of all AE Titles are accepted.
Exceed limit for number of connections supported	AE responds with A-ASSOCIATE reject (Temporary congestion, Reason Code 01)

7.3.2 DIMSE Services

7.3.2.1 Basic Worklist Management Service

7.3.2.1.1 SCU of the Modality Worklist Information Model Find SOP Class - C-FIND

Table 7.3-3 lists the Status Codes that the SCU of the Modality Worklist Information Model Find SOP Class supports for the C-FIND message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-3: Status Codes for C-FIND of the Modality Worklist Information Model SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Matching is complete - No final identifier is supplied	0000	The success is reported.
Failure	Refused: Out of Resources	A700	The issue is logged, the user is notified, and the association is closed.
	Error: Identifier does not match SOP Class	A900	
	Error: Unable to process	C000-CFFF	
Cancel	Matching terminated due to cancel	FE00	The association is closed.

Status Class	Further Meaning	Status Code	Behavior
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	The receiver waits for further data.
Pending	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier (no optional key support)	FF01	
Any other status code, not mentioned above.			The issue is logged, the user is notified, and the association is closed.

7.3.2.2 Modality Performed Procedure Step Service

7.3.2.2.1 SCU of the Modality Performed Procedure Step SOP Class - N-CREATE

Table 7.3-4 lists the Status Codes that the SCU of the Modality Performed Procedure Step SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-4: Status Codes for N-CREATE of the Modality Performed Procedure Step SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Failed MPPS messages are logged in a central log file. There is no retry mechanism.
Warning	Attribute Value Out of Range	0116	
	Attribute List Error	0107	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Attribute Value Out of Range	0116	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.2.2 SCU of the Modality Performed Procedure Step SOP Class - N-SET

Table 7.3-5 lists the Status Codes that the SCU of the Modality Performed Procedure Step SOP Class supports for the N-SET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-5: Status Codes for N-SET of the Modality Performed Procedure Step SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Failed MPPS messages are logged in a central log file. There is no retry mechanism.
Warning	Attribute Value Out of Range	0116	
	Attribute List Error	0107	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure - Performed Procedure Step Object may no longer be updated	0110	
	Processing Failure	0110	
	Attribute Value Out of Range	0116	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above.			

7.3.2.3 Storage Service

7.3.2.3.1 SCU of the Storage SOP Classes - C-STORE

Table 7.3-6 lists the Status Codes that the SCU of the Storage SOP Class supports for the C-STORE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-6: Status Codes C-STORE for the Storage SOP Classes - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	The success is reported.
Warning	Coercion of Data Elements	B000	The issue is logged, and the user gets notified about the Status.
	Data Set does not match SOP Class	B007	
	Elements Discarded	B006	
	Attribute list error	107	
	Attribute value out of range	116	
Failure	SOP Class not supported	0112	
	Invalid Object Instance	0117	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	

Status Class	Further Meaning	Status Code	Behavior
	Mistyped Argument	0212	
	Not authorized	0214	
	Out of Resources	A700-A7FF	
	Data Set does not match SOP Class	A900-A9FF	
	Cannot Understand	C000-CFFF	
	Processing failure	110	
	Duplicate instance	111	
	Invalid Data Set	122	
Any other Status Code not mentioned above			

7.3.2.3.2 SCP of the Storage SOP Classes - C-STORE

Table 7.3-7 lists the Status Codes that the SCP of the Storage SOP Classes supports for the C-STORE message and defines conditions in which the listed Status Codes are sent.

Table 7.3-7: Status Codes C-STORE of the Storage SOP Classes - SCP

Status Class	Further Meaning	Status Codes	Related Fields	Condition (and Comments on Related fields)
Success	Success	0000		Image received correctly. The success is reported. (success notification is done after receiving, before indexing and storing)
Warning	Duplicate SOP Instance	0111		Please note: This is only sent if late response mode is switched on. In early response mode, the sender will not learn of this warning, which will only be visible for the receiver
Error	Processing failure	0110		This DIMSE CODE is sent for every issue by storing and processing the received data.
	Out-of-resource	A700		No resource left in the Short Term Storage:
	Data set does not match SOP Class	A9xx		The data set is not conform to the SOP Class contained in the resource.
	Unable to process	Cxxx		Error during instance reception.

7.3.2.4 Storage Commitment Service

7.3.2.4.1 SCU of the Storage Commitment Push Model SOP Class - N-ACTION

Table 7.3-8 lists the Status Codes that the SCU of the Storage Commitment Push Model SOP Class supports for the N-ACTION message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-8: Status Codes for N-ACTION of the Storage Commitment Push Model SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success		0000	The success is reported.
Failure	Processing failure	0110	If any error code is received, Processing failure (0110) is reported. The instance the error was reported for, will not be considered as completely archived and mark accordingly as “Archive failed”.
	No such SOP Instance	0112	
	No such argument	0114	
	Invalid argument Value	0115	
	Invalid Object instance	0117	
	No such SOP Class	0118	
	Class-instance conflict	0119	
	No such action	0123	
	Refused: Not Authorized	0124	
	Duplicate invocation	0210	
	Unrecognized operation	0211	
	Mistyped argument	0212	
	Resource limitation	0213	
Any other status code not mentioned above			

7.3.2.4.2 SCU of the Storage Commitment Push Model SOP Class - N-EVENT-REPORT

A Reverse Role Negotiation takes place here. The SCU initiating the Storage Commitment will act as an SCP for the N-EVENT-REPORT-RQ message after the N-ACTION-RQ message is sent to the PACS node. So the sender of N-ACTION-RQ acts as an SCP by waiting for the Storage Commitment response in form of an N-EVENT-REPORT-RQ, which will be sent by the PACS in a new association initiated by the PACS.

Table 7.3-9 lists the Status Codes that the SCU of the Storage Commitment Push Model SOP Class supports for the N-EVENT-REPORT message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-9: Status Codes for N-EVENT-REPORT for the Storage Commitment Push Model SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success		0000	The success is reported.
Failure	Processing failure	0110	If any error code is received, Processing failure (0110) is reported. The instance the error was reported for, will not be considered as completely archived by the initiator of the Storage Commitment.
	No such SOP Instance	0112	
	No such argument	0114	
	Invalid argument Value	0115	
	Invalid Object instance	0117	
	No such SOP Class	0118	
	Class-instance conflict	0119	
	No such action	0123	
	Refused: Not Authorized	0124	
	Duplicate invocation	0210	

Status Class	Further Meaning	Status Code	Behavior
	Unrecognized operation	0211	
	Mistyped argument	0212	
Any other status code not mentioned above			

7.3.2.5 Query/Retrieve Service

7.3.2.5.1 SCU of the Query/Retrieve FIND SOP Classes - C-FIND

Table 7.3-10 lists the Status Codes that the SCU of any of the Query/Retrieve FIND SOP Class supports for the C-FIND message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-10: Status Codes C-FIND for Query/Retrieve FIND SOP Classes - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Matching is complete - No final identifier is supplied	0000	The success is reported, and the association is closed
Failure	Refused: Out of Resources	A700	The error code is logged and reported to the user.
	Error: Identifier does not match SOP Class	A900	
	Error: Unable to process	C000-CFFF	
	SOP Class Not Supported	0122	
Cancel	Matching terminated due to cancel	FE00	The association is closed. The error code is logged and reported to the user.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	These messages are not forwarded to the user. Pending state of the transaction is indicated to the user.
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier	FF01	
Any other status code not mentioned above			In case of any other status code received, the error code is logged and reported to the user.

7.3.2.5.2 SCU of the Query/Retrieve MOVE SOP Classes – C-MOVE

Table 7.3-11 lists the Status Codes that the SCU of any of the Query/Retrieve MOVE SOP Class supports for the C-MOVE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-11: Status Codes C-MOVE for Query/Retrieve MOVE SOP Classes – SCU

Status Class	Further Meaning	Status Codes	Related Fields	Behavior
Success	Sub-operations Complete – No Failures	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The success is reported.
Warning	Sub-operations Complete – One or more Failures	B000	(0000,1020) (0000,1022) (0000,1023)	The issue is reported to the user and logged.
Failed	Out of Resources – Unable to calculate number of matches	A701	(0000,0902)	The issue is reported to the user and logged.

Status Class	Further Meaning	Status Codes	Related Fields	Behavior
	Out of Resources – Unable to perform sub-operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The * stands for any digit.
	Move Destination unknown	A801	(0000,0902)	
	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)	
	Unable to process	C***	(0000,0901) (0000,0902)	
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The association is terminated.
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	No error is reported.
Any other status code not mentioned above				The issue is reported to the user and logged.

7.3.2.5.3 SCP of the Query/Retrieve FIND SOP Classes - C-FIND

Table 7.3-12 lists the Status Codes that the SCP of any of the Query/Retrieve FIND SOP Classes supports for the C-FIND message and defines conditions in which the listed Status Codes are sent.

Table 7.3-12: Status Codes C-FIND for Query/Retrieve FIND SOP Classes - SCP

Status Class	Further Meaning	Status Code	Condition
Success	Matching is complete - No final identifier is supplied	0000	The success answer is sent, and the association is closed.
Failure	Refused: Out of Resources	A700	
	Error: Identifier does not match SOP Class	A900	
	Error: Unable to process	C000	
	SOP Class Not Supported	0122	
Cancel	Matching terminated due to cancel	FE00	
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier	FF01	

Any non-success Status Code that appears is reported to the SCU and the association is closed.

7.3.2.5.4 SCP of the Query/Retrieve MOVE SOP Classes - C-MOVE

Table 7.3-13 lists the Status Codes that the SCP of any of the Query/Retrieve MOVE SOP Classes supports for the C-MOVE message and defines conditions in which the listed Status Codes are sent.

Table 7.3-13: Status Codes C-MOVE for Query/Retrieve MOVE SOP Classes - SCP

Status Class	Further Meaning	Status Codes	Related Fields sent in the response	Condition	Action on the Store due the condition.
Success	Sub-operations Complete - No Failures	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	No issue occurred.	The Success Code is sent to the calling SCU.
Warning	Sub-operations Complete - One or more Failures	B000	(0000,1020) (0000,1022) (0000,1023)	If no matches were found	The DIMSE code is sent to the calling SCU.
Failed	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)	The C-STORE operation failed.	The code is sent to the calling SCU.
	Out of Resources - Unable to perform sub-operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The chunking of the data to be send failed.	The code is sent to the calling SCU.
	Move Destination unknown	A801	(0000,0902)	The initialization of the C-STORE operation failed	The code is sent to the calling SCU.
	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)	The extraction of the Query information from C-MOVE RQ data set failed.	The code is sent to the calling SCU.
	Unable to process	C000	(0000,0901) (0000,0902)	Merging the data chunk failed. Transfer Syntax resolving failed. Resolving transfer syntaxes from the Presentation Context failed. The conversion of C-MOVE-RQ stream to data set failed. Context folder creation failed. Move Response Sender update failed. Instance check out failed. C-MOVE response sequencing failed. Context folder could not be deleted.	The Code is sent to the calling SCU.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)		The confirmation is sent to the calling SCU with Status Code CMovePendingMoreSubOperations (FF00)

7.3.2.6 Print Management Service

The DIMSE Codes received in the responses for Print Management related N-CREATE, N-SET and N-DELETE are all handled in the same way. They are forwarded to the user if:

- the DIMSE Code points to a failure or
- the DIMSE Code points to a warning.

Every DIMSE Code received in the response to an N-ACTION message is forwarded to the user.

The DICOM Module does not handle any of the DIMSE Codes.

7.3.2.6.1 SCU of the Basic Film Session SOP Class - N-CREATE

Table 7.3-14 lists the Status Codes that the SCU of the Basic Film Session SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-14: Status Codes for N-CREATE of the Basic Film Session SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues. The success code received in N-CREATE RSP is neither handled, nor forwarded to the user.
Warning	Attribute List Error	0107	Print job continues, warning is logged. The warnings received in the N-CREATE RSP are neither handled, nor forwarded to the user.
	Attribute Value Out of Range	0116	
	Memory allocation not supported	B600	
Failure	No Such Attribute	0105	In case of any failure occurred, the printing is suspended, and the user is going to be notified.
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.2 SCU of the Basic Film Box SOP Class - N-CREATE

Table 7.3-14 lists the Status Codes that the SCU of the Basic Film Box SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-15: Status Codes for N-CREATE of the Basic Film Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Attribute List Error	0107	
	Attribute Value Out of Range	0116	

Status Class	Further Meaning	Status Code	Behavior
	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	Print job continues and warning is logged.
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed.	C616	Print job is marked as failed and the reason is logged.
Any other Status Code not mentioned above			

7.3.2.6.3 SCU of the Basic Film Box SOP Class - N-DELETE

Table 7.3-16 lists the Status Codes that the SCU of the Basic Film Box SOP Class supports for the N-DELETE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-16: Status Codes for N-DELETE of the Basic Film Box SOP Class - SCU

Status class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.4 SCU of the Basic Film Box SOP Class - N-ACTION

Table 7.3-17 lists the Status Codes that the SCU of the Basic Film Box SOP Class supports for the N-ACTION message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-17: Status Codes for N-ACTION of the Basic Film Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	B603	Print job continues and warning is logged.
	Image size is larger than Image Box size. The image has been demagnified.	B604	
	Image size is larger than Image Box size. The image has been cropped to fit.	B609	
	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	
Failure	Processing failure	0110	
	No such SOP Instance	0112	
	No Such Argument	0114	
	Invalid argument Value	0115	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	No Such Action	0123	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	Unable to create Print Job SOP Instance; print queue is full.	C602	Print job is marked as failed and the reason is logged.
	Image size is larger than Image Box size.	C603	
	Combined Print Image Size is larger than Image Box size.	C613	
Any other Status Code not mentioned above			

7.3.2.6.5 SCU of the Basic Grayscale Image Box SOP Class - N-SET

Table 7.3-18 lists the Status Codes that the SCU of the Basic Grayscale Image Box SOP Class supports for the N-SET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-18: Status Codes for N-SET of the Grayscale Image Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Image size is larger than Image Box size. The image has been demagnified.	B604	Print job continues and the reason is logged.
	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	
	Image size is larger than Image Box size. The image has been cropped to fit.	B609	
	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	Image size is larger than Image Box size.	C603	Print job is marked as failed and the reason is logged.
	Insufficient memory in printer to store the image.	C605	
	Combined Print Image Size is larger than Image Box size.	C613	
Any other Status Code not mentioned above			

7.3.2.6.6 SCU of the Basic Color Image Box SOP Class - N-SET

Table 7.3-19 lists the Status Codes that the SCU of the Basic Color Image Box SOP Class supports for the N-SET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-19: Status Codes for N-SET of the Color Image Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Image size is larger than Image Box size. The image has been demagnified.	B604	Print job continues and the reason is logged.
	Image size is larger than Image Box size. The image has been cropped to fit.	B609	
	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	Image size is larger than Image Box size.	C603	Print job is marked as failed and the reason is logged.
	Insufficient memory in printer to store the image.	C605	
	Combined Print Image Size is larger than Image Box size.	C613	
Any other Status Code not mentioned above			

7.3.2.6.7 SCU of the Printer SOP Class - N-EVENT-REPORT

Table 7.3-20 lists the Status Codes that the SCU of Printer SOP Class supports for the N-EVENT-REPORT message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-20: Status Codes for N-EVENT-REPORT of the Printer SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	No Such SOP Instance	0112	
	No Such Event Type	0113	
	No Such Argument	0114	
	Invalid Argument Value	0115	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.8 SCU of the Printer SOP Class - N-GET

Table 7.3-21 lists the Status Codes that the SCU of the Printer SOP Class supports for the N-GET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-21: Status Codes for N-GET of the Printer SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Warning	Attribute List Error	0107	
Failure	Processing Failure	0110	
	No Such SOP Instance	0112	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.9 SCU of the Print Job SOP Class - N-EVENT-REPORT

Table 7.3-22 lists the Status Codes that the SCU of the Print Job SOP Class supports for the N-EVENT-REPORT message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-22: Status Codes N-EVENT-REPORT of the Print Job SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	No Such SOP Instance	0112	
	No Such Event Type	0113	
	No Such Argument	0114	
	Invalid Argument Value	0115	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.10 SCU of the Print Job SOP Class - N-GET

Table 7.3-23 lists the Status Codes that the SCU of Print Job SOP Class supports for the N-GET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-23: Status Codes for N-GET of the Print Job SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Warning	Attribute List Error	0107	
Failure	Processing Failure	0110	
	No Such SOP Instance	0112	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.11 SCU of the Presentation LUT SOP Class - N-CREATE

Table 7.3-24 lists the Status Codes that the SCU of the Presentation LUT SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-24: Status Codes N-CREATE of the Presentation LUTSOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Attribute List Error	0107	
	Attribute Value Out of Range	0116	
	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	Print job continues and the reason is logged.
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.12 SCU of the Presentation LUT SOP Class - N-DELETE

Table 7.3-25 lists the Status Codes that the SCU of the Presentation LUT SOP Class supports for the N-DELETE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-25: Status Codes for N-DELETE of the Presentation LUT SOP Class - SCU

Status class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.13 SCU of the Printer Configuration Retrieval SOP Class - N-GET

Table 7.3-26 lists the Status Codes that the SCU of the Printer Configuration SOP Class supports for the N-GET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-26: Status Codes N-GET of the Printer Configuration Retrieval SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Warning	Attribute List Error	0107	
Failure	Processing Failure	0110	
	No Such SOP Instance	0112	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

8 Security

8.1 Introduction

The security section describes security features implemented by this product. It includes description of non-DICOM network protocols, information to configure firewalls and application whitelists, list of supported DICOM security profiles as well as Web Security features. Additionally, secured media storage, VPN, etc. are also specified in this security section.

8.2 External Network Requirements

Table 8.2-1 describes additional non-DICOM network protocols that are used by YSIO X.pree.

Table 8.2-1: External Network Requirements

Profile	Actor	Transaction	Protocol Used	RFCs	Security Support	Reference
Basic Time Synchronization	NTP Server	Maintain Time	NTP	RFC5905	N	C.1.1
	NTP Client	Maintain Time	NTP	RFC5905	N	C.1.1
Basic Network Address Management	DHCP Client	Find and Use DHCP Server	DHCP	RFC2131; RFC2132; RFC2563	Y	C.1.2
		Maintain Lease	DHCP	RFC2131; RFC2132	Y	C.1.2
	DNS Client	Resolve Hostname	DNS	RFC1035; RFC2181;	Y	C.1.2

Please do note, that the supported profiles (DHCP, DNS and LDAP) are all supported using the APIs of the Operation System.

8.3 TCP Port Configuration

See section 6 Configuration for information on DICOM and other protocol Port usage. This section contains helpful information for product administrators to configure firewall, application whitelist, etc.

Firewall rules (inbound and outbound) for the standard DICOM ports 104 and 2762 for secure communication are set up automatically on installation. If any other port is used, the rules must be updated accordingly. The port numbers can be changed in the Administration Portal.

8.4 DICOM Security Profiles Support

8.4.1 Secure Use and User Identity Profiles

N/A

8.4.2 Secure Transport Connection Profiles

Table 8.4-1 describes the Secure Transport Connection Profiles supported by the product. Accepted cipher suites are described in the section listed in the “Reference” column.

Table 8.4-1: Secure Transport Connection Profiles

Profile	Secured AE	Sender	Receiver	Reference
BCP 195 RFC 8996, 9325 TLS Secure Transport Connection	ALL *	Y	Y	C.2.5

* The secured communication is configurable for the Local DICOM Remote node and every Remote DICOM Node separately.

Please do note, that in case a secure connection is established, the Operation System does not provide any technical possibility to actively select or specify in any way a certain Cipher Suite. Since YSIO X.pree is always provided together with the Operation System Microsoft Windows, the selection of the Cipher Suite happens automatically, based on the TLS Version used.

Hint: YSIO X.pree supports TLS 1.2 but not TLS 1.3. As requested by the profile TLS 1.1 and TLS 1.0 are not supported anymore.

8.4.3 Media Storage Security Profiles

N/A

8.4.4 Attribute Confidentiality Profiles

De-Identification, as specified in the DICOM Standard, is not supported by YSIO X.pree. As an alternative YSIO X.pree provides a Data Minimization feature, which can only be used in Media Export operations.

Data Minimization (see chapter 8.6) has three profiles: High Privacy, Reduced Privacy and Low Privacy.

Tags, that are not mentioned in the configuration for the Data Minimization profiles (explicitly or using a wildcard-type matching) will be ignored.

See section C.2.6 for implementation details.

8.4.5 Digital Signature Profiles

N/A

8.4.6 Additional DICOM Security Profiles

N/A

8.5 Other Security Features

8.5.1 Associtation Level Security

It is possible to configure whether the SCP will only answer to known AETs or to any AET.

See section 7.1.4.1.3 for details.

8.5.2 Application Level Security

User must login with own password.

For configuration and Maintenance, Service Technician must login with a separate password.

8.6 Data Minimization

YSIO X.pree application can minimize the data exported to Media. Three different levels of data minimization are supported:

- High Privacy
- Reduced Privacy
- Low Privacy

The user needs to select the appropriate data minimization level during export.

Handling public attributes during data minimization:

- Attributes listed in Table 8.6-1 will be affected by the data minimization as specified for the different levels. Attributes not listed in the table are not PII / PHI relevant and will not be affected by the data minimization. The list of the Tags affected by the above-mentioned Profiles can be modified in runtime by the Service User. Tags can be identified explicitly using the full Tag Number or using a wildcard-type pattern.

Handling private attributes during data minimization:

- Hight Privacy: private attributes are not included.
- Reduced Privacy: private attributes are not included except for the Tags excluded from the Data Minimization (see Table 8.6-2). Tags excluded from the Data Minimization will appear in the resulting Data Set.
- Low Privacy: all private attributes are included except for the Tags, which are meant to be included by configuration (see Table 8.6-2).

In the following table for attributes marked with:

Y(es) - data is minimized
N(o) - data is kept

Table 8.6-1: Data Minimization Profiles

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0002,0003)	Media Storage SOP Instance UID	Y	Y	N
(0004,1511)	Referenced SOP Instance UID in File	Y	Y	N
(0008,0014)	Instance Creator UID	Y	Y	N
(0008,0015)	Instance Coercion DateTime	Y	N	N
(0008,0018)	SOP Instance UID	Y	Y	N
(0008,0020)	Study Date	Y	N	N
(0008,0021)	Series Date	Y	N	N
(0008,0022)	Acquisition Date	Y	N	N
(0008,0023)	Content Date	Y	N	N
(0008,0024)	Overlay Date	Y	N	N
(0008,0025)	Curve Date	Y	N	N
(0008,002A)	Acquisition DateTime	Y	N	N
(0008,0030)	Study Time	Y	N	N
(0008,0031)	Series Time	Y	N	N
(0008,0032)	Acquisition Time	Y	N	N
(0008,0033)	Content Time	Y	N	N
(0008,0034)	Overlay Time	Y	N	N
(0008,0035)	Curve Time	Y	N	N
(0008,0050)	Accession Number	Y	Y	N
(0008,0058)	Failed SOP Instance UID List	Y	Y	N
(0008,0080)	Institution Name	Y	Y	Y
(0008,0081)	Institution Address	Y	Y	Y
(0008,0082)	Institution Code Sequence	Y	Y	N
(0008,0090)	Referring Physician's Name	Y	Y	Y
(0008,0092)	Referring Physician's Address	Y	Y	Y
(0008,0094)	Referring Physician's Telephone Numbers	Y	Y	Y
(0008,0096)	Referring Physician's Identification Sequence	Y	Y	N
(0008,010D)	Context Group Extension Creator UID	Y	Y	N
(0008,0201)	Time zone Offset From UTC	Y	N	N
(0008,1010)	Station Name	Y	Y	Y
(0008,1030)	Study Description	Y	Y	N

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0008,103E)	Series Description	Y	Y	N
(0008,1040)	Institutional Department Name	Y	Y	Y
(0008,1048)	Physician(s) of Record	Y	Y	Y
(0008,1049)	Physician(s) of Record Identification Sequence	Y	Y	N
(0008,1050)	Performing Physicians' Name	Y	Y	Y
(0008,1052)	Performing Physicians' Identification Sequence	Y	Y	N
(0008,1060)	Name of Physician(s) Reading Study	Y	Y	Y
(0008,1062)	Physician Reading Study Identification Sequence	Y	Y	N
(0008,1070)	Operators' Name	Y	Y	Y
(0008,1072)	Operators' Identification Sequence	Y	Y	N
(0008,1080)	Admitting Diagnoses Description	Y	Y	N
(0008,1084)	Admitting Diagnoses Code Sequence	Y	Y	N
(0008,1110)	Referenced Study Sequence	Y	N	N
(0008,1111)	Referenced Performed Procedure Step Sequence	Y	N	N
(0008,1120)	Referenced Patient Sequence	Y	Y	N
(0008,1140)	Referenced Image Sequence	Y	N	N
(0008,1155)	Referenced SOP Instance UID	Y	Y	N
(0008,1195)	Transaction UID	Y	Y	N
(0008,2111)	Derivation Description	Y	N	N
(0008,2112)	Source Image Sequence	Y	N	N
(0008,3010)	Irradiation Event UID	Y	Y	N
(0008,4000)	Identifying Comments	Y	Y	N
(0008,9123)	Creator Version UID	Y	Y	N
(0010,0010)	Patient's Name	Y	Y	Y
(0010,0020)	Patient ID	Y	Y	Y
(0010,0021)	Issuer of Patient ID	Y	Y	N
(0010,0030)	Patient's Birth Date	Y	Y	Y
(0010,0032)	Patient's Birth Time	Y	Y	N
(0010,0040)	Patient's Sex	Y	N	N
(0010,0050)	Patient's Insurance Plan Code Sequence	Y	Y	Y
(0010,0101)	Patient's Primary Language Code Sequence	Y	Y	Y
(0010,0102)	Patient's Primary Language Modifier Code Sequence	Y	Y	Y
(0010,1000)	Other Patient IDs	Y	Y	Y
(0010,1001)	Other Patient Names	Y	Y	Y
(0010,1002)	Other Patient IDs Sequence	Y	Y	Y
(0010,1005)	Patient's Birth Name	Y	Y	Y
(0010,1010)	Patient's Age	Y	N	N
(0010,1020)	Patient's Size	Y	N	N
(0010,1030)	Patient's Weight	Y	N	N
(0010,1040)	Patient Address	Y	Y	Y
(0010,1050)	Insurance Plan Identification	Y	Y	N
(0010,1060)	Patient's Mother's Birth Name	Y	Y	Y
(0010,1080)	Military Rank	Y	Y	N
(0010,1081)	Branch of Service	Y	Y	N
(0010,1090)	Medical Record Locator	Y	Y	N

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0010,1100)	Referenced Patient Photo Sequence	Y	Y	N
(0010,2000)	Medical Alerts	Y	Y	N
(0010,2110)	Allergies	Y	Y	N
(0010,2150)	Country of Residence	Y	Y	N
(0010,2152)	Region of Residence	Y	Y	N
(0010,2154)	Patient's Telephone Number	Y	Y	Y
(0010,2160)	Ethnic Group	Y	N	N
(0010,2180)	Occupation	Y	Y	N
(0010,21A0)	Smoking Status	Y	N	N
(0010,21B0)	Additional Patient's History	Y	Y	Y
(0010,21C0)	Pregnancy Status	Y	N	N
(0010,21D0)	Last Menstrual Date	Y	N	N
(0010,21F0)	Patient's Religious Preference	Y	Y	N
(0010,2203)	Patient Sex Neutered	Y	N	N
(0010,2297)	Responsible Person	Y	Y	N
(0010,2299)	Responsible Organization	Y	Y	N
(0010,4000)	Patient Comments	Y	Y	Y
(0018,0010)	Contrast Bolus Agent	Y	Y	N
(0018,1000)	Device Serial Number	Y	Y	N
(0018,1002)	Device UID	Y	Y	N
(0018,1004)	Plate ID	Y	Y	N
(0018,1005)	Generator ID	Y	Y	N
(0018,1007)	Cassette ID	Y	Y	N
(0018,1008)	Gantry ID	Y	Y	N
(0018,1030)	Protocol Name	Y	Y	N
(0018,1400)	Acquisition Device Processing Description	Y	Y	N
(0018,2042)	Target UID	Y	Y	N
(0018,4000)	Acquisition Comments	Y	Y	N
(0018,700A)	Detector ID	Y	Y	N
(0018,9424)	Acquisition Protocol Description	Y	Y	N
(0018,9516)	Start Acquisition DateTime	Y	N	N
(0018,9517)	End Acquisition DateTime	Y	N	N
(0018,A003)	Contribution Description	Y	Y	Y
(0020,000D)	Study Instance UID	Y	Y	N
(0020,000E)	Series Instance UID	Y	Y	N
(0020,0010)	Study ID	Y	Y	N
(0020,0052)	Frame of Reference UID	Y	Y	N
(0020,0200)	Synchronization Frame of Reference UID	Y	Y	N
(0020,3401)	Modifying Device ID	Y	Y	N
(0020,3404)	Modifying Device Manufacturer	Y	Y	N
(0020,3406)	Modified Image Description	Y	Y	N
(0020,4000)	Image Comments	Y	Y	N
(0020,9158)	Frame Comments	Y	Y	N
(0020,9161)	Concatenation UID	Y	Y	N
(0020,9164)	Dimension Organization UID	Y	N	N

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0028,1199)	Palette Color Lookup Table UID	Y	Y	N
(0028,1214)	Large Palette Color Lookup Table UID	Y	Y	N
(0028,4000)	Image Presentation Comments	Y	Y	N
(0032,0012)	Study ID Issuer	Y	Y	N
(0032,1020)	Scheduled Study Location	Y	Y	N
(0032,1021)	Scheduled Study Location AE Title	Y	Y	N
(0032,1030)	Reason for Study	Y	Y	N
(0032,1032)	Requesting Physician	Y	Y	N
(0032,1033)	Requesting Service	Y	Y	N
(0032,1060)	Requested Procedure Description	Y	Y	N
(0032,1070)	Requested Contrast Agent	Y	Y	N
(0032,4000)	Study Comments	Y	Y	N
(0038,0004)	Referenced Patient Alias Sequence	Y	Y	N
(0038,0010)	Admission ID	Y	Y	N
(0038,0011)	Issuer of Admission ID	Y	Y	N
(0038,001E)	Scheduled Patient Institution Residence	Y	Y	N
(0038,0020)	Admitting Date	Y	N	N
(0038,0021)	Admitting Time	Y	N	N
(0038,0040)	Discharge Diagnosis Description	Y	Y	N
(0038,0050)	Special Needs	Y	Y	N
(0038,0060)	Service Episode ID	Y	Y	N
(0038,0061)	Issuer of Service Episode ID	Y	Y	N
(0038,0062)	Service Episode Description	Y	Y	N
(0038,0300)	Current Patient Location	Y	Y	N
(0038,0400)	Patient's Institution Residence	Y	Y	N
(0038,0500)	Patient State	Y	Y	N
(0038,4000)	Visit Comments	Y	Y	N
(0040,0001)	Scheduled Station AE Title	Y	Y	N
(0040,0002)	Scheduled Procedure Step Start Date	Y	N	N
(0040,0003)	Scheduled Procedure Step Start Time	Y	N	N
(0040,0004)	Scheduled Procedure Step End Date	Y	N	N
(0040,0005)	Scheduled Procedure Step End Time	Y	N	N
(0040,0006)	Scheduled Performing Physician Name	Y	Y	N
(0040,0007)	Scheduled Procedure Step Description	Y	Y	N
(0040,000B)	Scheduled Performing Physician Identification Sequence	Y	Y	N
(0040,0010)	Scheduled Station Name	Y	Y	N
(0040,0011)	Scheduled Procedure Step Location	Y	Y	N
(0040,0012)	Pre-Medication	Y	Y	N
(0040,0241)	Performed Station AE Title	Y	Y	N
(0040,0242)	Performed Station Name	Y	Y	N
(0040,0243)	Performed Location	Y	Y	N
(0040,0244)	Performed Procedure Step Start Date	Y	N	N
(0040,0245)	Performed Procedure Step Start Time	Y	N	N
(0040,0250)	Performed Procedure Step End Date	Y	N	N
(0040,0251)	Performed Procedure Step End Time	Y	N	N

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0040,0253)	Performed Procedure Step ID	Y	Y	N
(0040,0254)	Performed Procedure Step Description	Y	Y	N
(0040,0275)	Request Attributes Sequence	Y	Y	N
(0040,0280)	Comments on Performed Procedure Step	Y	Y	N
(0040,0555)	Acquisition Context Sequence	Y	Y	N
(0040,1001)	Requested Procedure ID	Y	Y	N
(0040,1004)	Patient Transport Arrangements	Y	Y	N
(0040,1005)	Requested Procedure Location	Y	Y	N
(0040,1010)	Names of Intended Recipient of Results	Y	Y	N
(0040,1011)	Intended Recipients of Results Identification Sequence	Y	Y	N
(0040,1101)	Person Identification Code Sequence	Y	Y	N
(0040,1102)	Person Address	Y	Y	N
(0040,1103)	Person Telephone Numbers	Y	Y	N
(0040,1400)	Requested Procedure Comments	Y	Y	N
(0040,2001)	Reason for Imaging Service Request	Y	Y	N
(0040,2008)	Order Entered By	Y	Y	N
(0040,2009)	Order Enterer Location	Y	Y	N
(0040,2010)	Order Callback Phone Number	Y	Y	N
(0040,2016)	Placer Order Number of Imaging Service Request	Y	Y	N
(0040,2017)	Filler Order Number of Imaging Service Request	Y	Y	N
(0040,2400)	Imaging Service Request Comments	Y	Y	N
(0040,3001)	Confidentiality Constraint on Patient Data Description	Y	Y	N
(0040,4005)	Scheduled Procedure Step Start DateTime	Y	N	N
(0040,4010)	Scheduled Procedure Step Modification DateTime	Y	N	N
(0040,4011)	Expected Completion Date Time	Y	N	N
(0040,4023)	Referenced General Purpose Scheduled Procedure Step Transaction UID	Y	N	N
(0040,4025)	Scheduled Station Name Code Sequence	Y	Y	N
(0040,4027)	Scheduled Station Geographic Location Code Sequence	Y	Y	N
(0040,4028)	Performed Station Name Code Sequence	Y	Y	N
(0040,4030)	Performed Station Geographic Location Code Sequence	Y	Y	N
(0040,4034)	Scheduled Human Performers Sequence	Y	Y	N
(0040,4035)	Actual Human Performers Sequence	Y	Y	N
(0040,4036)	Human Performers Organization	Y	Y	N
(0040,4037)	Human Performers Name	Y	Y	N
(0040,4050)	Performed Procedure Step Start DateTime	Y	N	N
(0040,4051)	Performed Procedure Step End DateTime	Y	N	N
(0040,4052)	Procedure Step Cancellation DateTime	Y	N	N
(0040,A027)	Verifying Organization	Y	Y	N
(0040,A073)	Verifying Observer Sequence	Y	Y	N
(0040,A075)	Verifying Observer Name	Y	Y	N
(0040,A078)	Author Observer Sequence	Y	Y	N
(0040,A07A)	Participant Sequence	Y	Y	N
(0040,A07C)	Custodial Organization Sequence	Y	Y	N
(0040,A088)	Verifying Observer Identification Code Sequence	Y	Y	N

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0040,A123)	Person Name	Y	Y	N
(0040,A124)	UID	Y	Y	N
(0040,A171)	Observation UID	Y	Y	N
(0040,A172)	Referenced Observation UID (Trial)	Y	Y	N
(0040,A192)	Observation Date (Trial)	Y	N	N
(0040,A193)	Observation Time (Trial)	Y	N	N
(0040,A307)	Current Observer (Trial)	Y	Y	N
(0040,A352)	Verbal Source (Trial)	Y	Y	N
(0040,A353)	Address (Trial)	Y	Y	N
(0040,A354)	Telephone Number (Trial)	Y	Y	Y
(0040,A358)	Verbal Source Identifier Code Sequence (Trial)	Y	Y	N
(0040,A402)	Observation Subject UID (Trial)	Y	Y	N
(0040,A730)	Content Sequence	Y	Y	N
(0040,DB0C)	Template Extension Organization UID	Y	Y	N
(0040,DB0D)	Template Extension Creator UID	Y	Y	N
(0070,0001)	Graphic Annotation Sequence	Y	Y	N
(0070,0084)	Content Creator's Name	Y	Y	N
(0070,0086)	Content Creator's Identification Code Sequence	Y	Y	N
(0070,031A)	Fiducial UID	Y	Y	N
(0088,0140)	Storage Media Fileset UID	Y	Y	N
(0088,0200)	Icon Image Sequence	Y	Y	N
(0088,0904)	Topic Title	Y	Y	N
(0088,0906)	Topic Subject	Y	Y	N
(0088,0910)	Topic Author	Y	Y	N
(0088,0912)	Topic Keywords	Y	Y	N
(0400,0100)	Digital Signature UID	Y	Y	N
(0400,0402)	Referenced Digital Signature Sequence	Y	Y	N
(0400,0403)	Referenced SOP Instance MAC Sequence	Y	Y	N
(0400,0404)	MAC	Y	Y	N
(0400,0550)	Modified Attributes Sequence	Y	Y	N
(0400,0561)	Original Attributes Sequence	Y	Y	Y
(2030,0020)	Text String	Y	Y	N
(3006,0024)	Referenced Frame of Reference UID	Y	N	N
(3006,00C2)	Related Frame of Reference UID	Y	N	N
(3008,0105)	Source Serial Number	Y	N	N
(300A,0013)	Dose Reference UID	Y	N	N
(300E,0008)	Reviewer Name	Y	Y	N
(4000,0010)	Arbitrary	Y	Y	N
(4000,4000)	Text Comments	Y	Y	N
(4008,0042)	Results ID Issuer	Y	Y	N
(4008,0102)	Interpretation Recorder	Y	Y	N
(4008,010A)	Interpretation Transcriber	Y	Y	N
(4008,010B)	Interpretation Text	Y	Y	N
(4008,010C)	Interpretation Author	Y	Y	N
(4008,0111)	Interpretation Approver Sequence	Y	Y	N

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(4008,0114)	Physician Approving Interpretation	Y	Y	N
(4008,0115)	Interpretation Diagnosis Description	Y	Y	N
(4008,0118)	Results Distribution List Sequence	Y	Y	N
(4008,0119)	Distribution Name	Y	Y	N
(4008,011A)	Distribution Address	Y	Y	N
(4008,0202)	Interpretation ID Issuer	Y	Y	N
(4008,0300)	Impressions	Y	Y	N
(4008,4000)	Results Comments	Y	Y	N
(50**,****)	Curve Data	Y	Y	N
(60**,0100)	Overlay Bits Allocated	Y	Y	N
(60**,0102)	Overlay Bit Position	Y	Y	N
(60**,3000)	Overlay Data	Y	Y	N
(60**,4000)	Overlay Comments	Y	Y	N
(FFFA,FFFA)	Digital Signatures Sequence	Y	Y	Y
(FFFC,FFFC)	Data Set Trailing Padding	Y	Y	Y

The * stands for any digit.

Table 8.6-2: Removal of the Private DICOM Attributes in the Data Minimization Process

DICOM Tag	Attribute Name	High Privacy	Reduced Privacy	Low Privacy
(0019, SIEMENS CT VA0 COAD, 90)	Osteo offset	Y	N	N
(0019, SIEMENS CT VA0 COAD, 92)	Osteo Regression Line Slope	Y	N	N
(0019, SIEMENS CT VA0 COAD, 93)	Osteo Regression Line Intercept	Y	N	N
(0019, SIEMENS CT VA0 COAD, 96)	Osteo Phantom Number	Y	N	N
(0029, SIEMENS CSA ENVELOPE, 10)	Syngo Report Data	Y	N	N
(0029, SIEMENS CSA ENVELOPE, 11)	Syngo Report Presentation	Y	N	N
(0029, SIEMENS CSA HEADER, 08)	Modality Image Header Type	Y	N	N
(0029, SIEMENS CSA HEADER, 09)	Modality Image Header Version	Y	N	N
(0029, SIEMENS CSA HEADER, 10)	Modality Image Header Info	Y	N	N
(0029, SIEMENS CSA HEADER, 18)	Modality Series Header Type	Y	N	N
(0029, SIEMENS CSA HEADER, 19)	Modality Series Header Version	Y	N	N
(0029, SIEMENS CSA HEADER, 20)	Modality Series Header Info	Y	N	N
(0029, SIEMENS MEDCOM HEADER, 40)	Application Header Sequence	Y	N	N
(0029, SIEMENS MEDCOM HEADER, 41)	Application Header Type	Y	N	N
(0029, SIEMENS MEDCOM HEADER, 42)	Application Header ID	Y	N	N
(0029, SIEMENS MEDCOM HEADER, 43)	Application Header Version	Y	N	N
(0029, SIEMENS MEDCOM HEADER, 44)	Application Header Info	Y	N	N
(0029, SIEMENS CT APPL DATASET, 00)	Dual Energy Algorithm Parameters	Y	N	N
(0029, SIEMENS CT APPL ALG PARAMS, 20)	Perfusion Result Set Id	Y	N	N
(0043, GEMS_PARM_01, 1E)	GE Delta Start Time	Y	N	N

Annex A Information Object Definitions (IODs)

This section provides the detailed content for all the SOP Instances natively created by YSIO X.pree (all SOP Classes that are marked in the “Created” column in Table 1.1-1). Details on Attribute coercion are defined in Section 5.2.3.2.

All acquired images are stored and can be exported in an unprocessed format (“Digital X-Ray Image Storage - For Processing”) and in format convenient for reading (“Digital X-Ray Image Storage - For Presentation”). The processed images can also be converted to CR format (Computed Radiography Image Storage) when sent out.

In addition to that, Dose Reports are created for each examination (X-Ray Radiation Dose SR Storage).

Throughout the tables listed in Annex A the following codes are used for the “Source” and “Presence” columns.

In the “Source” column, the following Values can be used:

- FIXED: The Value is pre-defined and cannot be modified.
- GENERATED: The Value is generated by the system.
- CONFIGURATION: The Value is copied from system configuration.
- MWL: The Value is copied from Modality Worklist entry.
- QUERY: The Value is determined by performing a query of any of the supported Query/Retrieve Services.
- USER: The Value is entered by the user.
- SCANNED: The Value is read from a barcode scanner or similar device.
- EMPTY: The Attribute is sent without Value.
- SRC_INSTANCE: The Value is copied from previously created/received SOP Instances.

The “Presence” columns reflect the usage of the Module, Functional Group Macro, Attributes, or Value in the YSIO X.pree Implementation and is not necessarily the same as defined in the DICOM Standard. For the “Presence” column the following Values can be used:

- ALWAYS: the module, functional group macro, Attributes or Value is always present.
- NEVER: the module, functional group macro, attribute or value is never present.
- CONDITIONAL: the presence of the module, functional group macro, Attributes or Value is dependent on a condition. The condition must be listed in the “Conditions” column.
- SRC_COPY: The presence of the Attributes and Values depends on the availability of these in the source instances, which are used for copying this information.
- EMPTY: The Attribute is present but without a Value (zero length).

A.1 Information shared across multiple IODs

A.1.1 Common Modules

All SOP Instances generated by the system use the common modules listed in Table A.1.1-1 to Table A.1.1-14 or a subset of them, as defined in the IOD specific subsections below.

A.1.1.1 Patient Module

Table A.1.1-1: Patient Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Patient's Name	(0010,0010)	MWL, USER, GENERATED	ALWAYS	ALWAYS	Name of patient.	
Patient ID	(0010,0020)	MWL, USER, GENERATED	ALWAYS	ALWAYS	ID of patient.	
Issuer of Patient ID	(0010,0021)	MWL	CONDITIONAL	CONDITIONAL	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID.	Depending on the availability of the data in the MWL.
Patient's Birth Date	(0010,0030)	MWL, USER, GENERATED	ALWAYS	ALWAYS	Birth date of patient.	
Patient's Sex	(0010,0040)	MWL, USER, GENERATED	ALWAYS	ALWAYS	M: male F: female O: other	
Other Patient Ids	(0010,1000)	MWL, USER	CONDITIONAL	CONDITIONAL	Other identification numbers or codes used to identify the patient.	Depending on the availability of the data in the MWL or if entered by the user.
Other Patient Names	(0010,1001)	MWL, USER	CONDITIONAL	CONDITIONAL	Other names used to identify the Patient.	Depending on the availability of the data in the MWL or if entered by the user.
Quality Control Subject	(0010,0200)	GENERATED	ALWAYS	ALWAYS	Indicates whether the subject is a quality control phantom ("YES" or "NO"). "YES" for images that were acquired - in a service workflow of category "IQAP" - in an Adjustment workflow Otherwise "NO"	
Ethnic Group	(0010,2160)	MWL, USER	CONDITIONAL	CONDITIONAL	Ethnic group of the Patient.	Depending on the availability of the data in the MWL or if entered by the user.
Patient Comments	(0010,4000)	MWL, USER	CONDITIONAL	CONDITIONAL	User-defined additional information about the Patient.	Depending on the availability of the data in the MWL or if entered by the user.
Patient Identity Removed	(0012,0062)	GENERATED	CONDITIONAL	ALWAYS	"YES" in case of minimized export, otherwise not present.	Only in case of minimized export.

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
De-identification Method	(0012,0063)	GENERATED	CONDITIONAL	ALWAYS	Describes the De-identification method in case of minimized export, otherwise not present. 'Service Use' in case of Service export. Otherwise identifies the profile from "De-identification Method Code Sequence" that was applied.	Only in case of minimized export.
De-identification Method Code Sequence	(0012,0064)	GENERATED	CONDITIONAL	ALWAYS	Describes the (coded) De-identification method in case of minimized export, otherwise not present. Hight Privacy: (DCM,113100,"Basic Application Confidentiality Profile") Low Privacy: not present Reduced Privacy: (DCM,113106,"Retain Longitudinal Temporal Information With Full Dates Option") (DCM,113108,"Retain Patient Characteristics Option") (DCM,113110,"Retain UIDs Option")	Only in case of minimized export.

In case of an Emergency Patient, the data of the Patient are generated. This can be changed later, after the Patient was identified.

A.1.1.2 General Study Module

Table A.1.1-2: General Study Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Study Instance UID	(0020,000D)	MWL, GENERATED	ALWAYS	ALWAYS	Study Instance UID from Modality Worklist in case of RIS registered studies, otherwise locally generated.	
Study Date	(0008,0020)	GENERATED	ALWAYS	ALWAYS	Taken from Modality Worklist. Date of first image acquisition in case of locally registered study.	
Study Time	(0008,0030)	GENERATED	ALWAYS	ALWAYS	Taken from Modality Worklist. Time of first image acquisition in case of locally registered study.	
Referring Physician's Name	(0008,0090)	MWL	ALWAYS	CONDITIONAL	Taken from Modality Worklist or entered by the user.	Depending on the availability of the data in the MWL or if entered by the user.
Study ID	(0020,0010)	MWL, GENERATED	ALWAYS	ALWAYS	Requested Procedure ID from Modality Worklist. If not available (empty or locally generated	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					procedure): Device generated identifier.	
Accession Number	(0008,0050)	GENERATED	ALWAYS	ALWAYS	Taken from Modality Worklist or entered by the user.	
Study Description	(0008,1030)	MWL, GENERATED	ALWAYS	ALWAYS	Contains the "Displayed Text" from the attribute that was used for RIS matching. Concatenated in case of several CPs. If not available (e.g. local registration): Concatenation of the CP names.	
Referenced Study Sequence	(0008,1110)	GENERATED	ALWAYS	ALWAYS	Copy from Modality Worklist. Empty in case of locally registered study.	
Procedure Code Sequence	(0008,1032)	GENERATED	ALWAYS	CONDITIONAL	Empty in case of locally registered study. In scheduled case (procedure from Modality Worklist): - Copy from Requested Procedure Code SQ (0032,1064) in case the performed procedure was the planned procedure (no changes in RIS mapping) - Otherwise (change in RIS mapping: empty)	Depends if the CP was planned in RIS or locally registered.

A.1.1.3 Patient Study Module

Table A.1.1-3: Patient Study Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Admitting Diagnoses Description	(0008,1080)	MWL, GENERATED	ALWAYS	ALWAYS	Description of the admitting diagnosis (diagnoses).	
Patient's Age	(0010,1010)	MWL, USER, GENERATED	ALWAYS	ALWAYS	Age of the patient when the examination is executed.	
Patient's Size	(0010,1020)	MWL, USER	ALWAYS	ALWAYS	Size of the patient in meters when the examination is executed.	
Patient's Weight	(0010,1030)	MWL, USER	ALWAYS	ALWAYS	Weight of the patient in kilograms when the examination is executed.	
Medical Alerts	(0010,2000)	MWL, USER	ALWAYS	CONDITIONAL	Conditions to which medical staff should be alerted (e.g., contagious condition, drug	Depending on the availability of the data in the MWL or if entered by the user.
Allergies	(0010,2110)	MWL, USER	ALWAYS	CONDITIONAL	allergies, etc.). Taken from Modality Worklist or entered by the user.	
Pregnancy Status	(0010,21C0)	MWL, USER	ALWAYS	CONDITIONAL	0001: „not pregnant" 0002: „possibly pregnant" 0003: „definitely pregnant" 0004: „unknown"	
Admission ID	(0038,0010)	MWL, GENERATED	ALWAYS	ALWAYS	Taken from Modality Worklist or entered by the user.	

A.1.1.4 General Series Module

Table A.1.1-4: General Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Modality	(0008,0060)	FIXED	ALWAYS	ALWAYS	"DX" for DX images "CR" for CR images	
Series Instance UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	Every RAD image is stored in a separate series. All RAD images for an ORTHO series are stored in the same series. Each composed image is stored in a separate series. Unprocessed images and processed images are stored in different series. Reprocessed images are stored in the same series as the first processed image.	
Series Number	(0020,0011)	GENERATED	ALWAYS	ALWAYS	PROCESSED: For each series a running number is generated starting with 1. UNPROCESSED: For each series a running number is generated starting with 5001. For each new study the counter is reset to 1.	
Laterality	(0020,0060)	USER	ALWAYS	CONDITIONAL	Can be "R", "L", "U", "B".	Only available if entered by user.
Series Date	(0008,0021)	GENERATED	ALWAYS	ALWAYS	Date, when the first object in this series was created	
Series Time	(0008,0031)	GENERATED	ALWAYS	ALWAYS	Time, when the first object in this series was created	
Performing Physician's Name	(0008,1050)	GENERATED	ALWAYS	ALWAYS	Pre-filled with “Scheduled Performing Physician’s Name” from Modality Worklist. Can be overwritten by the user.	
Protocol Name	(0018,1030)	USER, GENERATED	ALWAYS	ALWAYS	Name of CP Step.	
Series Description	(0008,103E)	USER, GENERATED	ALWAYS	ALWAYS	Name of CP Step.	
Operators' Name	(0008,1070)	USER, GENERATED	ALWAYS	ALWAYS	Value as entered during patient registration. Pre-filled with login name of current user.	
Referenced Performed Procedure Step Sequence	(0008,1111)	MWL	ALWAYS	ALWAYS	Reference to the MPPS object.	
Body Part Examined	(0018,0015)	GENERATED	ALWAYS	ALWAYS	The Body Model / CP defines organs that are mapped to DICOM Body Parts as follows: Skull => SKULL, Jaw => JAW, C-Spine => CSPINE, T-Spine => TSPINE, L-Spine => LSPINE, S-Spine => SSPINE, Knee => KNEE, Ankle => ANKLE, Foot => FOOT, Leg => LEG, Chest => CHEST, Abdomen => AB-DOMEN, Shoulder =>	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					SHOULDER, Clavicle => CLAVICLE, Elbow => ELBOW, Hand => HAND, Pelvis => PELVIS, Hip => HIP, Fore-arm => FOREARM, Humerus => HUMER-US, Tibia => TIBIA, Femur => FEMUR, VertebralColumn => VERTEBRALCOLUMN	
Patient Position	(0018,5100)	USER	ALWAYS	CONDITIONAL	Patient position descriptor relative to the equipment.	Only if entered by the user.
Request Attributes Sequence	(0040,0275)	MWL	ALWAYS	CONDITIONAL	Collects information taken from Modality Worklist.	Empty in case of locally registered patient.
>Requested Procedure ID	(0040,1001)	MWL	CONDITIONAL	CONDITIONAL	The Requested Procedure ID from main worklist request.	Not contained in case of locally registered patient.
>Accession Number	(0008,0050)	MWL	CONDITIONAL	CONDITIONAL	The Accession from main worklist request.	
>Study Instance UID	(0020,000D)	MWL	CONDITIONAL	CONDITIONAL	The Study Instance UID from worklist request.	
>Referenced Study Sequence	(0008,1110)	MWL	CONDITIONAL	CONDITIONAL	The Referenced Study Sequence from worklist request.	
>Requested Procedure Description	(0032,1060)	MWL	CONDITIONAL	CONDITIONAL	The Requested Procedure Description from worklist request.	
>Requested Procedure Code Sequence	(0032,1064)	MWL	CONDITIONAL	CONDITIONAL	The Requested Procedure Code Sequence from worklist request.	
>Reason for the Requested Procedure	(0040,1002)	MWL	CONDITIONAL	CONDITIONAL	The Reason for the Requested Procedure from worklist request.	
>Scheduled Procedure Step ID	(0040,0009)	MWL	CONDITIONAL	CONDITIONAL	The Scheduled Procedure Step ID from worklist request (contained in Scheduled Procedure Step Sequence).	
>Scheduled Procedure Step Description	(0040,0007)	MWL	CONDITIONAL	CONDITIONAL	The Scheduled Procedure Description from worklist request (contained in Scheduled Procedure Step Sequence).	
>Scheduled Protocol Code Sequence	(0040,0008)	MWL	CONDITIONAL	CONDITIONAL	The Scheduled Procedure Protocol Code Sequence from worklist request (contained in Scheduled Procedure Step Sequence).	
Performed Procedure Step ID	(0040,0253)	GENERATED	ALWAYS	ALWAYS	Internally generated. The PPSID of the MPPS instance to which this series is related.	
Performed Procedure Step Start Date	(0040,0244)	GENERATED	ALWAYS	ALWAYS	Date when the first acquisition for the CP took place.	
Performed Procedure Step Start Time	(0040,0245)	GENERATED	ALWAYS	ALWAYS	Time when the first acquisition for the CP took place.	
Performed procedure step Description	(0040,0254)	GENERATED	ALWAYS	ALWAYS	CP Name	

A.1.1.5 General Equipment Module

Table A.1.1-5: General Equipment Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Manufacturer	(0008,0070)	FIXED	ALWAYS	ALWAYS	Siemens	Depends on the Equipment
Institution Name	(0008,0080)	CONFIG	ALWAYS	ALWAYS	Institution Name from Modality Worklist request or if not available: Combination of Institution Name and Hospital Name from local configuration (AdminPortal: Site Information / Customer)	
Institution Address	(0008,0081)	CONFIG	ALWAYS	ALWAYS	Institution Address from Modality Worklist request, if the Institution Name was also provided via Modality Worklist. Otherwise: Institution Address from local config in this format: Street StreetNumber ZipCode City District Country	
Station Name	(0008,1010)	CONFIG	ALWAYS	ALWAYS	„Ward" from AdminPortal („Site Information" / „Customer")	
Institutional Department Name	(0008,1040)	CONFIG	ALWAYS	ALWAYS	„Department" from AdminPortal („Site Information" / „Customer")	
Manufacturer's Model Name	(0008,1090)	FIXED	ALWAYS	ALWAYS	„Model" from Local DICOM Node config.	
Device Serial Number	(0018,1000)	FIXED	ALWAYS	ALWAYS	The serial number of the device.	
Software Versions	(0018,1020)	CONFIG	ALWAYS	ALWAYS	1st entry: system marketing version with SYS prefix 2nd entry: UIS version with UIS prefix 3rd entry: Version for internal data	

A.1.1.6 General Acquisition

Table A.1.1-6: General Acquisition Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Acquisition Date	(0008,0022)	N/A	N/A	N/A	See General Image Module	
Acquisition Time	(0008,0032)	N/A	N/A	N/A	See General Image Module	
Acquisition DateTime	(0008,002A)	N/A	N/A	N/A	See General Image Module	
Irradiation Event UID	(0008,3010)	N/A	N/A	N/A	See General Image Module	

A.1.1.7 General Image Module

Table A.1.1-7: General Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Instance Number	(0020,0013)	GENERATED	ALWAYS	ALWAYS	Current number of the image in creation order within a series, e.g. 1,2,3... Next series again starts with 1.	
Content Date	(0008,0023)	GENERATED	ALWAYS	ALWAYS	Date, when the pixel data or content was created.	
Content Time	(0008,0033)	GENERATED	ALWAYS	ALWAYS	Time, when the pixel data or content was created.	
Image Type	(0008,0008)	GENERATED	ALWAYS	ALWAYS	See DX Image Module.	
Quality Control Image	(0028,0300)	GENERATED	ALWAYS	ALWAYS	See „Quality Control Subject“ in Patient Module.	
Acquisition Number	(0020,0012)	GENERATED	ALWAYS	ALWAYS	Running number of the acquisition event for the active patient starting with 1. Empty for Ortho composed images.	
Acquisition Date	(0008,0022)	GENERATED	ALWAYS	ALWAYS	Date, when the image was acquired In case of composed images the date of the last acquired projection image is taken.	
Acquisition Time	(0008,0032)	GENERATED	ALWAYS	ALWAYS	Time, when the image was acquired In case of composed images the time of the last acquired projection image is taken.	
Acquisition DateTime	(0008,002A)	GENERATED	ALWAYS	ALWAYS	Date/Time, when the image was acquired In case of composed images the time of the last acquired projection image is taken.	
Irradiation Event UID	(0008,3010)	GENERATED	ALWAYS	ALWAYS	For the acquisition of each RAD image an "Irradiation Event UID" is generated and stored in the DICOM header of that image (both: unprocessed + processed). For ORTHO each original image gets an own "Irradiation Event UID". The composed image contains all "Irradiation Event UIDs" of the original images referenced (VM=1-n). In case of flavor change the reprocessed images all have the same Irradiation UID as they belong to the same Irradiation Event, but they all have a different SOPINUID.	
Burned In Annotation	(0028,0301)	FIXED	ALWAYS	ALWAYS	„YES“, if annotations were entered by the user and the configuration is accordingly (Admin Portal under Global DICOM Settings), otherwise „NO“.	
Lossy Image Compression	(0028,2110)	GENERATED	CONDITIONAL	CONDITIONAL	In case the image is transferred in lossy format: 01 Otherwise: 00	If the image was compressed once in a lossy format.
Lossy Image Compression Ratio	(0028,2112)	GENERATED	CONDITIONAL	CONDITIONAL	The compression ratio in case the image is transferred in lossy format.	
Lossy Image Compression Method	(0028,2114)	GENERATED	CONDITIONAL	CONDITIONAL	The compression method in case the image is transferred in lossy format.	
Presentation LUT Shape	(2050,0020)	GENERATED	ALWAYS	ALWAYS	„IDENTITY“ as Photometric Interpretation is always „MONOCHROME2“	

A.1.1.8 General Reference Module

Table A.1.1-8: General Reference Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Derivation Description	(0008,2111)	GENERATED	ALWAYS	CONDITIONAL	"Ortho composed image" "Image Recovery Candidate" (for unprocessed image with black image pixel data before recovery) "Recovered Image" (for unprocessed image with recovered pixel data and for processed image which is generated from the recovered unprocessed image)	Only set in case the image is an Ortho-composed image or the image was recovered.
Source Image Sequence	(0008,2112)	GENERATED	ALWAYS	CONDITIONAL	In case of Ortho-composed images the resulting image contains references to the original projections. In case of DX images the "FOR PRESENTATION" images contain references to the "FOR PROCESSING" images.	"FOR PRESENTATION" image or Ortho-composed image.

A.1.1.9 Image Pixel Module

Table A.1.1-9: Image Pixel Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Samples per Pixel	(0028,0002)	FIXED	ALWAYS	ALWAYS	1	
Photometric Interpretation	(0028,0004)	FIXED	ALWAYS	ALWAYS	"MONOCHROME2" In case of inversion, the pixel data is changed.	
Rows	(0028,0010)	GENERATED	ALWAYS	ALWAYS	Number of Rows	
Columns	(0028,0011)	GENERATED	ALWAYS	ALWAYS	Number of Columns	
Bits Allocated	(0028,0100)	FIXED	ALWAYS	ALWAYS	16	
Bits Stored	(0028,0101)	CONFIGURATION	ALWAYS	ALWAYS	Globally configurable ("Global DICOM Settings"): 12 or 16.	
High Bit	(0028,0102)	GENERATED	ALWAYS	ALWAYS	Depends on "Bits Stored": 11 or 15	
Pixel Representation	(0028,0103)	FIXED	ALWAYS	ALWAYS	0	
Pixel Data	(7FE0,0010)	GENERATED	ALWAYS	ALWAYS	A data stream of the pixel samples that comprise the Image.	

A.1.1.10 Contrast/Bolus Module

Table A.1.1-10: Contrast/Bolus Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Contrast/Bolus Agent	(0018,0010)	GENERATED	ALWAYS	ALWAYS	User entered value for Contrast/Bolus Agent.	

A.1.1.11 Overlay Plane Module

Table A.1.1-11: Overlay Plane Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Overlay Rows	(60xx,0010)	GENERATED	ALWAYS	ALWAYS	Number of Rows in overlay.	
Overlay Columns	(60xx,0011)	GENERATED	ALWAYS	ALWAYS	Number of Columns in overlay.	
Overlay Type	(60xx,0040)	FIXED	ALWAYS	ALWAYS	"G"	
Overlay Origin	(60xx,0050)	GENERATED	ALWAYS	ALWAYS	Location of first overlay point with respect to pixels in the image, given as row\column.	
Overlay Bits Allocated	(60xx,0100)	FIXED	ALWAYS	ALWAYS	1	
Overlay Bit Position	(60xx,0102)	FIXED	ALWAYS	ALWAYS	0	
Overlay Data	(60xx,3000)	GENERATED	ALWAYS	ALWAYS	Overlay pixel data.	
Overlay Label	(60xx,1500)	FIXED	ALWAYS	ALWAYS	"GRAPHICAL OBJECTS"	

A.1.1.12 VOI LUT Module

Table A.1.1-12: VOI LUT Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Window Center	(0028,1050)	GENERATED, USER	ALWAYS	ALWAYS	First value is the Window Center after user adjustments, second is the original value from auto window. User value might be skipped, if the user did not change windowing.	
Window Width	(0028,1051)	GENERATED, USER	ALWAYS	ALWAYS	First value is the Window Width after user adjustments, second is the original value from auto window. User value might be skipped, if the user did not change windowing.	
Window Center & Width Explanation	(0028,1055)	GENERATED, USER	ALWAYS	ALWAYS	1. USER 2. GENERATED	

A.1.1.13 SOP Common Module

Table A.1.1-13: SOP Common Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
SOP Class UID	(0008,0016)	FIXED	ALWAYS	ALWAYS	Computed Radiography Image Storage: 1.2.840.10008.5.1.4.1.1.1 Digital X-Ray Image Storage - For Presentation: 1.2.840.10008.5.1.4.1.1.1.1 Digital X-Ray Image Storage - For Processing: 1.2.840.10008.5.1.4.1.1.1.1.1 X-Ray Radiation Dose SR: 1.2.840.10008.5.1.4.1.1.88.67	
SOP Instance UID	(0008,0018)	GENERATED	ALWAYS	ALWAYS	Unique UID for the SOP Instance.	
Specific Character Set	(0008,0005)	CONFIG	ALWAYS	CONDITIONAL	Contains the Character Set string for the local language. Only required, if characters outside ISO-IR 6 (English) are used. The Character Set used depends on the local configuration.	Required if an expanded or replacement character set is used.
Instance Creation Date	(0008,0012)	GENERATED	ALWAYS	ALWAYS	Date, when the instance was created.	
Instance Creation Time	(0008,0013)	GENERATED	ALWAYS	ALWAYS	Time, when the instance was created.	
Instance Creator UID	(0008,0014)	GENERATED	ALWAYS	ALWAYS	Device/Product UID	
Instance Number	(0020,0013)	GENERATED	ALWAYS	ALWAYS	See General Image Module.	
Original Attributes Sequence	(0400,0561)	GENERATED	CONDITIONAL	ALWAYS	Contains attributes that were changed after the image was acquired.	Only contained for images, not for Dose Reports. Only contained if attributes were changed after the image was acquired.
>Source of Previous Values	(0400,0564)	EMPTY	ALWAYS	EMPTY	Empty	
>Attribute Modification DateTime	(0400,0562)	GENERATED	ALWAYS	ALWAYS	Date/Time of modification	
>Modifying System	(0400,0563)	FIXED	ALWAYS	ALWAYS	"Siemens Healthcare *syngo* Transfer Framework"	
>Reason for the Attribute Modification	(0400,0565)	FIXED	ALWAYS	ALWAYS	"COERCE"	
>Modified Attributes Sequence	(0400,0550)	GENERATED	ALWAYS	ALWAYS	Contains the changed attributes.	

A.1.1.14 Common Instance Reference Module

Table A.1.1-14: Common Instance Reference Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Referenced Series Sequence	(0008,1115)	GENERATED	ALWAYS	CONDITIONAL	For Ortho composed image the composed image refers to all original images.	Only contained if Ortho-composed image. Not written for RAD images.
>Series Instance UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	Series Instance UID of the series containing referenced original images.	
>Referenced Instance Sequence	(0008,114A)	GENERATED	ALWAYS	ALWAYS	Referenced instances in the series.	

A.1.2 Common Functional Group Macros

N.A.

A.1.3 Common Private Modules

The tables below list private Attributes that are used in multiple IODs generated by the system. For documentation convenience and readability, they are organized in modules, although the concept of modules does not exist in the standard for private Attributes.

A.1.3.1 Private Module "UIS Common"

Table A.1.3-1: Private Module "UIS Common"

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0015,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	"UIS_COMMON"	
Comments on Image Generation	(0015,xx01)	UT	1	GENERATED	ALWAYS	CONDITIONAL	Describes the Image generation (e.g. special error scenarios).	Only in case of an error.
Clinical Protocol Step Instance ID	(0015,xx09)	LO	1	GENERATED	ALWAYS	ALWAYS	Identifies the runtime instance of a Clinical Protocol Step.	
Clinical Protocol Name	(0015,xx10)	LO	1	USER	ALWAYS	ALWAYS	The name of the Clinical Protocol.	
Clinical Protocol Step Name	(0015,xx11)	LO	1	USER	ALWAYS	ALWAYS	The name of the Clinical Protocol Step.	
Clinical Protocol Step GUID	(0015,xx12)	LO	1	GENERATED	ALWAYS	ALWAYS	The global unique identifier for the Clinical Protocol Step.	
Original Clinical Protocol Name	(0015,xx13)	LO	1	USER	ALWAYS	ALWAYS	The name of the Clinical Protocol in English.	
Original Clinical Protocol Step Name	(0015,xx14)	LO	1	USER	ALWAYS	ALWAYS	The name of the Clinical Protocol Step in English.	
Image Type	(0015,xx15)	LO	1	GENERATED	ALWAYS	ALWAYS	Can be: „2D" „Ortho" „Ortho Composed"	

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Acquisition Type	(0015,xx16)	LO	1	USER	ALWAYS	ALWAYS	Can be: „Table“ „Wall Stand“ „Free Exposure“	
Table Object Distance (TOD)	(0015,xx17)	DS	1	USER	CONDITIONAL	CONDITIONAL	Distance between patient and table in mm.	Only set for Ortho acquisitions.
Table Detector Distance (TDD)	(0015,xx18)	DS	1	GENERATED	CONDITIONAL	CONDITIONAL	Distance between detector and table in mm.	Only set for Ortho acquisitions.
Detector Mode Number	(0015,xx19)	US	1	GENERATED	ALWAYS	ALWAYS	Detector Mode Number: RAD = 30 LTE = 31	
Exposure Correction	(0015,xx20)	DS	1	USER	CONDITIONAL	CONDITIONAL	Exposure Correction in EP that the user specified before acquisition. E.g. -3, -2.5, -2, ... ,0,0.5, ... ,2.5,3	Only in case of Exposure Correction.
Dose Level	(0015,xx21)	DS	1	USER	CONDITIONAL	CONDITIONAL	Dose Level that the user specified before acquisition. E.g. 0.9, 1, 1.1, ... ,4,4.5,5	Only in case Dose Level was set.
Ortho Direction	(0015,xx30)	LO	1	USER	CONDITIONAL	CONDITIONAL	Ortho direction: „HEAD2FEET“/“FEET2HEAD“	Only set for Ortho acquisitions.
Ortho Composing	(0015,xx31)	CS	1	GENERATED	CONDITIONAL	CONDITIONAL	„A“: Auto „M“: Manual	Only set for Ortho acquisitions.
Ortho Transition Mode	(0015,xx32)	CS	1	USER	CONDITIONAL	CONDITIONAL	BLEND CUT	Only set for Ortho acquisitions.
Ortho Step Distance	(0015,xx33)	US	1	GENERATED	CONDITIONAL	CONDITIONAL	Distance to previous ortho step in 0.1 mm (from upper edge to upper edge of previous image in series). Value equals to 0 in the first image of the Ortho series (Instance Number =1).	Only set for Ortho acquisitions.
Ortho Algorithm	(0015,xx34)	LO	1	USER	CONDITIONAL	CONDITIONAL	"SPINE", "LLD_ORTHO", "LLD_ORTHO_ONELEG" or "IMAGE_BASED" in ortho projection and composed images.	Only set for Ortho acquisitions.
Ortho Overlap	(0015,xx35)	DS	1	GENERATED	CONDITIONAL	CONDITIONAL	The overlap of the ortho projections used for composing.	Only set for Ortho acquisitions.
Ortho Composing Method	(0015,xx36)	LO	1	CONFIG	CONDITIONAL	CONDITIONAL	The composing method used for ortho stitching ("IMAGE_BASED", "GEOMETRIC_BASED").	Only set for Ortho acquisitions.
Cropping Points	(0015,xx50)	SS	2-n	USER	CONDITIONAL	CONDITIONAL	Points in image plane used for cropping.	Only set in case image was cropped.

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Autocropping	(0015,xx51	CS	1	GENERATED	CONDITIONAL	CONDITIONAL	"YES" in case the cropping points indicate the results of the Autocropping. "NO" otherwise.	Only set in case image was cropped.
Manual Cropping Points	(0015,xx52)	SS	2-n	USER	CONDITIONAL	CONDITIONAL	Points in image plane used for manual cropping.	Only set in case image was manually cropped.
Cropping Rotation	(0015,xx53)	DS	1	USER	CONDITIONAL	CONDITIONAL	Rotation applied during cropping.	Only set in case image was rotated during cropping.
Selected Age Range	(0015,xx60)	LO	1	USER	ALWAYS	ALWAYS	The selected Age Range. E.g. "10-14 y".	
Selected Patient Modifier	(0015,xx61)	CS	1	USER	ALWAYS	ALWAYS	The selected Patient Size Modifier: "S", "M", "L", XL"	

A.1.3.2 Private Module “Image Rejection”

Table A.1.3-2: Private Module “Image Rejection”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0017,00xx)	LO	1	GENERATED	CONDITIONAL	CONDITIONAL	“SIEMENS_FLCOMPACT_VA01A_PROC”	Only in case the image was rejected.
IsRejected	(0017,xxCA)	US	1	USER	CONDITIONAL	CONDITIONAL	0 (not rejected) 1 (rejected)	
RejectReason	0017,xxCB)	LO	1	USER	CONDITIONAL	CONDITIONAL	The reason for rejection entered by the user, if available, otherwise empty.	
RejectUser	0017,xxCC)	LO	1	USER	CONDITIONAL	CONDITIONAL	The operator who rejected the image, if available, otherwise empty.	
RejectDateTime	0017,xxCD)	DT	1	USER	CONDITIONAL	CONDITIONAL	The date and time, when the image was rejected.	

A.1.3.3 Private Module “Image Presentation”

Table A.1.3-3: Private Module “Image Presentation”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0019,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	“UIS_IMAGE_PRESENTATION”	
TPS	(0019,xx10)	SQ	1	USER	CONDITIONAL	CONDITIONAL	The Technical Presentation State object for this image is stored in a single item in this sequence.	Only in case image was exported in Backup Mode.

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
UIS Export Mode	(0019,xx20)	CS	1	USER	ALWAYS	ALWAYS	Indicates the mode, how the image was exported: BACKUP CLINICAL	
Pre-Horizontal Flip	(0019,xx41)	CS	1	CONFIG	CONDITIONAL	CONDITIONAL	Whether or not to flip the image horizontally after any Image Rotation has been applied such that the left side of the image becomes the right side. Enumerated Values: YES, NO	Only stored in unprocessed images.
Pre-Rotation Angle	(0019,xx42)	DS	1	CONFIG	CONDITIONAL	CONDITIONAL	Rotation Angle in degrees.	
CP Step Horizontal Flip	(0019,xx43)	CS	1	CONFIG	CONDITIONAL	CONDITIONAL	Horizontal Flip from CP Step. Enumerated Values: YES, NO	
CP Step Vertical Flip	(0019,xx44)	CS	1	CONFIG	CONDITIONAL	CONDITIONAL	Vertical Flip from CP Step. Enumerated Values: YES, NO	
CP Step Rotation Angle	(0019,xx45)	DS	1	CONFIG	CONDITIONAL	CONDITIONAL	Rotation Angle in degrees from CP Step.	

A.1.3.4 Private Module “Image Processing”

Table A.1.3-4: Private Module “Image Processing”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0021,00xx)	LO	1	GENERATED	CONDITIONAL	CONDITIONAL	“UIS_IQ_IP”	Only for processed images.
Flavor Template	(0021,xx10)	OB	1	GENERATED	CONDITIONAL	CONDITIONAL	BLOB that contains some meta information for the flavors and the flavor parameters.	
Flavor Modifier	(0021,xx11)	OB	1	GENERATED	CONDITIONAL	CONDITIONAL	Contains the flavor customizing parameters.	
Flavor Name	(0021,xx12)	LO	1	USER	CONDITIONAL	CONDITIONAL	Contains the original name of the flavor that was used for the processing of the image.	
Flavor Processing Lane	(0021,xx13)	LO	1	USER	CONDITIONAL	CONDITIONAL	LANE1 for Default Flavor LANE2 for Secondary Flavor	
Readable CIPT and Flavor Information	(0021,xx14)	LT	1	GENERATED	CONDITIONAL	CONDITIONAL	Contains the following information about CIPT and Flavors: CIPT, Flavor, Version, UI Parameters with UI Parameter as B (Brightness), C (Contrast), Small Structures (S),	

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
							Medium Structures (M), Dynamic (D), Noise Reduction (N)	

A.1.3.5 Private Module “Smart Sensing”

Table A.1.3-5: Private Module “Smart Sensing”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0021,00xx)	LO	1	GENERATED	CONDITIONAL	CONDITIONAL	“UIS_SMART_SENSING_ALGO ”	Only in case Auto Algorithm was used.
Algorithm	(0025,xx10)	LO	1	USER	CONDITIONAL	CONDITIONAL	Indicates which algorithm was originally applied to the image. E.g.:"AutoThorax LAT".	
Smart Sensing Algorithm Values	(0025,xx11)	LT	1	USER	CONDITIONAL	CONDITIONAL	Autothorax Algorithm: "CH;CW" with CH = Collimator Height taken from IBLENDEANZ telegram (HOEHENBLENDE) CW = Collimator Width taken from IBLENDEANZ telegram (BREITENBLENDE)	
Smart Sensing Algorithm Correction Values	(0025,xx12)	LT	1	SCANNED	CONDITIONAL	CONDITIONAL	Configured Correction Values for the selected Smart Sensing Algorithm	

A.1.3.6 Private Module “Pixel Padding”

Table A.1.3-6: Private Module “Pixel Padding”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(7FDF,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	“SIEMENS SYNGO DATA PADDING”	
Pixel Data Leading Padding	(7FDF,xxFC)	OB	1	GENERATED	ALWAYS	ALWAYS	N/A	

A.2 Basic Directory IOD

Table A.2-1: IOD of created Basic Directory SOP Class Instances

IE	Module	Reference	Presence of Module
File-set Identification	File-set Identification Module	Table A.2.1-3	ALWAYS
Directory Information	Directory Information Module	Table A.2.1-2	ALWAYS

A.2.1 Basic Directory IOD Specific Modules

Table A.2.1-2: Directory Information Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions	Comments
Offset of the First Directory Record of the Root Directory Entity	(0004,1200)	GENERATED	ALWAYS	ALWAYS			
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	GENERATED	ALWAYS	ALWAYS			
File-set Consistency Flag	(0004,1212)	GENERATED	ALWAYS	ALWAYS			
Directory Record Sequence	(0004,1220)	GENERATED	ALWAYS	ALWAYS			
>Offset of the Next Directory Record	(0004,1400)	GENERATED	ALWAYS	ALWAYS			
>Record In-use Flag	(0004,1410)	GENERATED	ALWAYS	ALWAYS			
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	GENERATED	ALWAYS	ALWAYS			
>Directory Record Type	(0004,1430)	GENERATED	ALWAYS	ALWAYS			
>Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS			
>Patient's Name	(0010,0010)	GENERATED	ALWYS	ALWAYS			
>Patient ID	(0010,0020)	GENERATED	ALWAYS	ALWAYS			
>Patient's Birth Date	(0010,0030)	GENERATED	ALWAYS	ALWAYS			
>Patient's Sex	(0010,0040)	GENERATED	ALWAYS	ALWAYS			

Table A.2.1-3: File-set Identification Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions	Comments
File-set ID	(0004,1130)	GENERATED	ALWAYS	ALWAYS			

A.3 Digital X-Ray Image Storage IOD

Table A.3-1defines the structure of Digital X-Ray Image Storage IOD.

Table A.3-1: IOD of created Digital X-Ray Image Storage SOP Class Instances

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS	N/A	Table A.1.1-1
Study	General Study	ALWAYS	N/A	Table A.1.1-2
	Patient Study	ALWAYS	N/A	Table A.1.1-3
Series	General Series	ALWAYS	N/A	Table A.1.1-4
	DX Series	ALWAYS	N/A	Table A.3.1-2
Equipment	General Equipment	ALWAYS	N/A	Table A.1.1-5
Acquisition	General Acquisition	ALWAYS	N/A	Table A.1.1-6
Image	General Image	ALWAYS	N/A	Table A.1.1-7
	General Reference	CONDITIONAL	Only in case of Ortho or Image Recovery.	Table A.1.1-8
	Image Pixel	ALWAYS	N/A	Table A.1.1-9
	Contrast/Bolus	CONDITIONAL	If entered by user.	Table A.1.1-10
	DX Anatomy Imaged	ALWAYS	N/A	Table A.3.1-3
	DX Image	ALWAYS	N/A	Table A.3.1-4
	DX Detector	ALWAYS	N/A	Table A.3.1-5
	X-Ray Collimator	ALWAYS	N/A	Table A.3.1-6
	DX Positioning	CONDITIONAL	If entered by user.	Table A.3.1-7
	X-Ray Acquisition Dose	ALWAYS	N/A	Table A.3.1-8
	X-Ray Generation	ALWAYS	N/A	Table A.3.1-9
	X-Ray Filtration	ALWAYS	N/A	Table A.3.1-10
	X-Ray Grid	ALWAYS	N/A	Table A.3.1-11
	Overlay Plane	CONDITIONAL CONFIG	If entered by user.	Table A.1.1-11
	VOI LUT	ALWAYS	N/A	Table A.1.1-12
	Acquisition Context	ALWAYS	N/A	Table A.3.1-12
	SOP Common	ALWAYS	N/A	Table A.1.1-13
	Common Instance Reference	CONDITIONAL	For Ortho images.	Table A.1.1-14
Private	UIS Common	ALWAYS	N/A	Table A.1.3-1
	Image Rejection	CONDITIONAL	For rejected images.	Table A.1.3-2
	Image Presentation	ALWAYS	N/A	Table A.1.3-3
	Image Processing	ALWAYS	N/A	Table A.1.3-4
	Pixel Padding	ALWAYS	N/A	Table A.1.3-6

A.3.1 Digital X-Ray Image Storage IOD Specific Modules

Table A.3.1-2: DX Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Modality	(0008,0060)	FIXED	ALWAYS	ALWAYS	"DX"	
Referenced Performed Procedure Step Sequence	(0008,1111)	MWL	ALWAYS	ALWAYS	Reference to the MPPS object.	See General Series Module.
Presentation Intent Type	(0008,0068)	GENERATED	ALWAYS	ALWAYS	"FOR PRESENTATION" for processed images. "FOR PROCESSING" for unprocessed images.	

Table A.3.1-3: DX Anatomy Imaged Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Image Laterality	(0020,0062)	USER	ALWAYS	ALWAYS	Can be "R", "L", "U", "B".	Only available if entered by user.
Anatomic Region Sequence	(0008,2218)	CONFIGURATION, USER	ALWAYS	ALWAYS	Skull => (89546000,SCT,"Skull") Jaw => (661005,SCT,"Jaw Region") C-Spine => (122494005,SCT,"Cervical spine") T-Spine => (122495006,SCT,"Thoracic spine") L-Spine => (122496007,SCT,"Lumbar spine") S-Spine => (54735007,SCT,"Sacrum") Knee => (72696002,SCT,"Knee") Ankle => (70258002,SCT,"Ankle joint") Foot => (56459004,SCT,"Foot") Chest => (51185008,SCT,"Chest") Abdomen => (113345001,SCT,"Abdomen") Shoulder => 16982005,SCT,"Shoulder") Clavicle => (51299004,SCT,"Clavicle") Elbow => (16953009,SCT,"Elbow joint") Hand => (85562004,SCT,"Hand") Pelvis => (12921003,SCT,"Pelvis") Hip => HIP (29836001,SCT,"Hip joint") Forearm => (14975008,SCT,"Forearm") Humerus => (85050009,SCT,"Humerus") Tibia => (12611008,SCT,"Tibia") Femur => (71341001,SCT,"Femur") VertebralColumn => (110517009,SCT, "Vertebral column and cranium") Leg => (416631005,SCT, "Pelvis and lower extremities")	
>Code Value	(0008,0100)	CONFIGURATION, USER	ALWAYS	ALWAYS	See above	
>Coding Scheme Designator	(0008,0102)	CONFIGURATION, USER	ALWAYS	ALWAYS	See above	
>Code Meaning	(0008,0104)	CONFIGURATION, USER	ALWAYS	ALWAYS	See above	

Table A.3.1-4: DX Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Image Type	(0008,0008)	CONFIGURATION, USER	ALWAYS	ALWAYS	"ORIGINAL\PRIMARY\\RAD" for RAD images. "DERIVED\SECONDARY*algorithm*" for Composed Ortho images ("SPINE", "LLD_ORTHO", "LLD_ORTHO_ONELEG", "IMAGE_BASED" for *algorithm*) In case of reprocessing (another flavor used): The Image Type does not change.	
Samples per Pixel	(0028,0002)	GENERATED	ALWAYS	ALWAYS		
Photometric Interpretation	(0028,0004)	GENERATED	ALWAYS	ALWAYS	See Image Pixel Module.	
Bits Allocated	(0028,0100)	GENERATED	ALWAYS	ALWAYS	16	
Bits Stored	(0028,0101)	GENERATED	ALWAYS	ALWAYS	See Image Pixel Module.	
High Bit	(0028,0102)	GENERATED	ALWAYS	ALWAYS	See Image Pixel Module.	
Pixel Representation	(0028,0103)	GENERATED	ALWAYS	ALWAYS	0	
Pixel Intensity Relationship	(0028,1040)	GENERATED	ALWAYS	ALWAYS	LIN for unprocessed images DISP for processed images	
Pixel Intensity Relationship Sign	(0028,1041)	USER	ALWAYS	ALWAYS	The sign of the relationship between the Pixel sample values stored in Pixel Data (7FE0,0010) and the X-Ray beam intensity. -1: Higher pixel values correspond to less X-Ray beam intensity "1" by default "-1" in case of inversion	
Rescale Intercept	(0028,1052)	FIXED	ALWAYS	ALWAYS	0	
Rescale Slope	(0028,1053)	FIXED	ALWAYS	ALWAYS	1	
Rescale Type	(0028,1054)	FIXED	ALWAYS	ALWAYS	US	
Presentation LUT Shape	(2050,0020)	FIXED	ALWAYS	ALWAYS	See General Image Module.	
Lossy Image Compression	(0028,2110)	GENERATED	CONDITIONAL	ALWAYS	See General Image Module.	
Lossy Image Compression Ratio	(0028,2112)	GENERATED	CONDITIONAL	ALWAYS	See General Image Module.	
Derivation Description	(0008,2111)	GENERATED	CONDITIONAL	CONDITIONAL	See General Reference Module	
Calibration Image	(0050,0004)	GENERATED	ALWAYS	ALWAYS	"YES" in case this image is used for detector CALIBRATION, otherwise "NO".	
Burned In Annotation	(0028,0301)	FIXED	ALWAYS	ALWAYS	See General Image Module.	
Window Center	(0028,1050)	USER GENERATED	ALWAYS	ALWAYS	First value is the Window Center after user adjustments, second is the original value from auto window. Not contained for unprocessed images.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					User value might be skipped, if the user did not change windowing.	
Window Width	(0028,1051)	USER GENERATED	ALWAYS	ALWAYS	First value is the Window Width after user adjustments, second is the original value from auto window. Not contained for unprocessed images. User value might be skipped, if the user did not change windowing.	
Window Center & Width Explanation	(0028,1055)	USER GENERATED	ALWAYS	ALWAYS	1. USER 2. AUTO Not contained for unprocessed images.	

Table A.3.1-5: DX Detector Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Detector Type	(0018,7004)	FIXED	ALWAYS	ALWAYS	"SCINTILLATOR"	
Detector Configuration	(0018,7005)	FIXED	ALWAYS	ALWAYS	"AREA"	
Detector Description	(0018,7006)	GENERATED	ALWAYS	ALWAYS	serial#-part#-firmware-detectorcode-FDtype	
Detector ID	(0018,700A)	GENERATED	ALWAYS	ALWAYS	Serial Number of detector	
Date of Last Detector Calibration	(0018,700C)	GENERATED	ALWAYS	ALWAYS	The date on which the detector used to acquire this image as identified in Detector ID (0018,700A) was last calibrated. Empty if not calibrated.	
Time of Last Detector Calibration	(0018,700E)	GENERATED	ALWAYS	ALWAYS	The time at which the detector used to acquire this image as identified in Detector ID (0018,700A) was last calibrated. Empty if not calibrated.	
Detector Binning	(0018,701A)	FIXED	ALWAYS	ALWAYS	1\1	
Detector Manufacturer Name	(0018,702A)	FIXED	ALWAYS	ALWAYS	TRIXELL	
Detector Manufacturer's Model Name	(0018,702B)	GENERATED	ALWAYS	ALWAYS	Model name of the detector component of the acquisition system.	
Detector Conditions Nominal Flag	(0018,7000)	GENERATED	ALWAYS	ALWAYS	"NO", if something is uncommon (not calibrated, expired, different detector, Temperature not within calibrated range), otherwise "YES"	
Detector Temperature	(0018,7001)	GENERATED	ALWAYS	ALWAYS	Detector temperature during exposure in degrees Celsius.	
Exposure Index	(0018,1411)	GENERATED	ALWAYS	ALWAYS	Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1. Empty for Ortho composed images.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Target Exposure Index	(0018,1412)	CONFIG	ALWAYS	ALWAYS	Target Exposure Index as defined in IEC 62494-1. For 1-pt-technique: 100 * dose_level (from CP Step) For other techniques: value from corresponding 1-pt-technique variant. Empty for Ortho composed images.	
Deviation Index	(0018,1413)	GENERATED CONFIG	ALWAYS	ALWAYS	DI = 10 * log10(EI/TEI) Exposure Index (EI) and Target Exposure Index (TEI) Only written for processed images. Empty for Ortho composed images.	
Field of View Shape	(0018,1147)	FIXED	CONDITIONAL	CONDITIONAL	RECTANGLE	Only for unprocessed images.
Field of View Dimension(s)	(0018,1149)	GENERATED	CONDITIONAL	CONDITIONAL	Dimensions in mm of the Field of View, that is the image pixels stored in Pixel Data (7FE0,0010). Row dimension followed by column.	Only for unprocessed images, otherwise absent.
Field of View Origin	(0018,7030)	GENERATED	CONDITIONAL	CONDITIONAL	Offset of the TLHC (top left-hand corner) of a rectangle circumscribing the Field of View, that is the image pixels stored in Pixel Data (7FE0,0010), before rotation or flipping, from the TLHC of the physical detector area measured in physical detector pixels as a row offset followed by a column offset.	Only for unprocessed images, otherwise absent.
Field of View Rotation	(0018,7032)	GENERATED	CONDITIONAL	CONDITIONAL	Clockwise rotation in degrees of Field of View, that is the image pixels stored in Pixel Data (7FE0,0010), relative to the physical detector. Enumerated Values: 0,90,180,270	Only for unprocessed images, otherwise absent.
Field of View Horizontal Flip	(0018,7034)	GENERATED	CONDITIONAL	CONDITIONAL	Whether or not a horizontal flip has been applied to the Field of View, that is the image pixels stored in Pixel Data (7FE0,0010), after rotation relative to the physical detector as described in Field of View Rotation (0018,7032). Enumerated Values: YES,NO	Only for unprocessed images, otherwise absent.
Imager Pixel Spacing	(0018,1164)	GENERATED	ALWAYS	ALWAYS	Physical distance measured at the front plane of the detector housing between the center of each image pixel specified by a numeric pair - row spacing value (delimiter) column spacing value in mm.	
Pixel Spacing	(0028,0030)	USER CONFIG	CONFIG	CONFIG	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. If a magnification factor is received during an acquisition then the pixel spacing attribute in the DICOM header will be filled: Pixel spacing (0028, 0030) = Image pixel spacing * (SOD / SID). Also in case of successful image calibration the Pixel Spacing is contained.	Always set, if the image was calibrated. In case the image was not calibrated, it depends on the configuration, if the Imager pixel Spacing is copied.

Table A.3.1-6: X-Ray Collimator Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Collimator Shape	(0018,1700)	GENERATED	ALWAYS	ALWAYS	"RECTANGULAR"	
Collimator Left Vertical Edge	(0018,1702)	GENERATED	ALWAYS	ALWAYS	Location of the left edge of the rectangular collimator with respect to pixels in the image given as column.	
Collimator Right Vertical Edge	(0018,1704)	GENERATED	ALWAYS	ALWAYS	Location of the right edge of the rectangular collimator with respect to pixels in the image given as column.	
Collimator Upper Horizontal Edge	(0018,1706)	GENERATED	ALWAYS	ALWAYS	Location of the upper edge of the rectangular collimator with respect to pixels in the image given as row.	
Collimator Lower Horizontal Edge	(0018,1708)	GENERATED	ALWAYS	ALWAYS	Location of the lower edge of the rectangular collimator with respect to pixels in the image given as row.	

Table A.3.1-7: DX Positioning Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Patient Position	(0018,5100)	USER	ALWAYS	CONDITIONAL	Patient position descriptor relative to the equipment.	Only if entered by the user.
View Position	(0018,5101)	USER	ALWAYS	CONDITIONAL	Possible values: "AP", "PA", "LATERAL", "OBLIQUE"	
View Code Sequence	(0054,0220)	USER	CONDITIONAL	CONDITIONAL	Can be entered by the user. Baseline CID 4010 "DX View". Empty if not defined. Possible values: (399348003,SCT,"antero-posterior") (272479007,SCT,"postero-anterior") (399182000,SCT,"oblique") (399067008,SCT,"lateral")	
>Code Value	(0008,0100)	USER	CONDITIONAL	CONDITIONAL		
>Coding Scheme Designator	(0008,0102)	USER	CONDITIONAL	CONDITIONAL		
>Code Meaning	(0008,0104)	USER	CONDITIONAL	CONDITIONAL		
Distance Source to Patient	(0018,1111)	USER	ALWAYS	CONDITIONAL	Distance in mm from source to center of field of view. Also known as SOD (Source Object Distance).	Only set in case it is known, otherwise empty.
Distance Source to Detector	(0018,1110)	USER GENERATED	ALWAYS	CONDITIONAL	Distance in mm from source to detector center. Also known as SID (Source Image Distance).	
Estimated Radiographic Magnification Factor	(0018,1114)	USER	ALWAYS	CONDITIONAL	Ratio of Source Image Receptor Distance (SID) over Source Object Distance (SOD).	
Positioner Type	(0018,1508)	FIXED	ALWAYS	ALWAYS	CARM	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Detector Primary Angle	(0018,1530)	GENERATED	CONDITIONAL	CONDITIONAL	Angle of the X-Ray beam in the row direction in degrees relative to the normal to the detector plane. Positive values indicate that the X-Ray beam is tilted toward higher numbered columns. Negative values indicate that the X-Ray beam is tilted toward lower numbered columns.	Only contained, if this value is known.
Detector Secondary Angle	(0018,1531)	GENERATED	CONDITIONAL	CONDITIONAL	Angle of the X-Ray beam in the column direction in degrees relative to the normal to the detector plane. Positive values indicate that the X-Ray beam is tilted toward lower numbered rows. Negative values indicate that the X-Ray beam is tilted toward higher numbered rows.	Only contained, if this value is known.
Table Type	(0018,113A)	GENERATED	ALWAYS	ALWAYS	For table acquisitions: "FIXED" otherwise NONE	

Table A.3.1-8: X-Ray Acquisition Dose Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
KVP	(0018,0060)	GENERATED	ALWAYS	ALWAYS	Peak kilo voltage output of the X-Ray generator used. For ortho composed images: If all KV values in the projection images are equal: this value, otherwise empty.	
X-Ray Tube Current	(0018,1151)	GENERATED	ALWAYS	ALWAYS	X-Ray Tube Current in mA Empty for Ortho Composed image	
X-Ray Tube Current in µA	(0018,8151)	GENERATED	ALWAYS	ALWAYS	X-Ray Tube Current in µA. Empty for Ortho Composed image	
Exposure Time	(0018,1150)	GENERATED	ALWAYS	ALWAYS	Duration of X-Ray exposure in ms.	
Exposure Time in µS	(0018,8150)	GENERATED	ALWAYS	ALWAYS	Duration of X-Ray exposure in µs.	
Exposure	(0018,1152)	GENERATED	ALWAYS	ALWAYS	The exposure expressed in mAs.	
Exposure in µAs	(0018,1153)	GENERATED	ALWAYS	ALWAYS	The exposure expressed in µAs.	
Distance Source to Detector	(0018,1110)	USER GENERATED	CONDITIONAL	CONDITIONAL	See DX Positioning.	
Distance Source to Patient	(0018,1111)	USER	CONDITIONAL	CONDITIONAL	See DX Positioning.	
Image and Fluoroscopy Area Dose Product	(0018,115E)	GENERATED	ALWAYS	ALWAYS	DAP in dGy cm^2 in case a DAP chamber is present, otherwise empty	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					In case of Ortho composed images the sum of all DAP values of the projection images.	
Relative X-Ray Exposure	(0018,1405)	GENERATED	ALWAYS	CONDITIONAL	Physical EXI.	Empty for ORTHO composed images.
Entrance Dose	(0040,0302)	GENERATED	ALWAYS	CONDITIONAL	Same as skin dose/air kerma/Dose at Reference Point. Measured in dGy.	Only available, if SID and SOD are known. Otherwise empty. For ortho composed image the sum of all Entrance Dose values of the projection images.
Entrance Dose in mGy	(0040,8302)	GENERATED	ALWAYS	CONDITIONAL	Same as skin dose/air kerma/Dose at Reference Point. Measured in mGy.	See above
Entrance Dose Derivation	(0040,8303)	GENERATED	ALWAYS	ALWAYS	IAK	
Anode Target Material	(0018,1191)	GENERATED	ALWAYS	ALWAYS	TUNGSTEN	
Filter Type	(0018,1160)	USER	ALWAYS	ALWAYS	FLAT in case COPPER filter is used, otherwise NONE	
Filter Material	(0018,7050)	USER	ALWAYS	CONDITIONAL	COPPER	Empty if no copper filter used.
Filter Thickness Minimum	(0018,7052)	USER	ALWAYS	ALWAYS	thickness of copper filter 0.0 if no filter used	
Filter Thickness Maximum	(0018,7054)	USER	ALWAYS	ALWAYS	thickness of copper filter 0.0 if no filter used	
Rectification Type	(0018,1156)	GENERATED	ALWAYS	ALWAYS	CONST POTENTIAL	
Exposure Index	(0018,1411)	GENERATED	ALWAYS	ALWAYS	See DX Detector.	
Target Exposure Index	(0018,1412)	GENERATED CONFIG	ALWAYS	ALWAYS	See DX Detector.	
Deviation Index	(0018,1413)	GENERATED	ALWAYS	ALWAYS	See DX Detector.	

Table A.3.1-9: X-Ray Generation Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
KVP	(0018,0060)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
X-Ray Tube Current	(0018,1151)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
X-Ray Tube Current in µA	(0018,8151)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
Exposure Time	(0018,1150)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
Exposure Time in µS	(0018,8150)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Exposure	(0018,1152)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
Exposure in µAs	(0018,1153)	GENERATED	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
Exposure Control Mode	(0018,7060)	GENERATED	ALWAYS	ALWAYS	AUTOMATIC for 1-pt-technique MANUAL for 2-pt and 3-pt technique	
Exposure Control Mode Description	(0018,7062)	GENERATED	ALWAYS	ALWAYS	Used technique („1-pt","2-pt","3-pt"). For 1-pt-technique additional information about AEC chambers from AKTMESSF is contained.	
Focal Spot(s)	(0018,1190)	GENERATED	ALWAYS	ALWAYS	Focal spot size in mm.	

Table A.3.1-10: X-Ray Filtration Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Filter Type	(0018,1160)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Filter Material	(0018,7050)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Filter Thickness Minimum	(0018,7052)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Filter Thickness Maximum	(0018,7054)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	

Table A.3.1-11: X-Ray Grid Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Grid	(0018,1166)	USER	ALWAYS	ALWAYS	FIXED in case of fixed grid FOCUSED in case of focused grid UNKNOWN in case this is not known (mobile detector) NONE, if no grid was inserted/used.	
Grid Absorbing Material	(0018,7040)	GENERATED	CONDITIONAL	CONDITIONAL	"LEAD"	Absent in case of no grid.
Grid Spacing Material	(0018,7041)	GENERATED	CONDITIONAL	CONDITIONAL		Absent in case of no grid. Empty otherwise.
Grid Focal Distance	(0018,704C)	GENERATED	CONDITIONAL	CONDITIONAL	Focal distance in mm of a FOCUSED grid.	Otherwise absent.

Table A.3.1-12: Acquisition Context Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Acquisition Context Sequence	(0040,0555)	FIXED	ALWAYS	EMPTY	EMPTY	

A.4 Computed Radiography Image Storage IOD

Table A.4-1 defines the structure of Computed Radiography Image Storage IOD.

Table A.4-1: IOD of created Computed Radiography Image Storage SOP Class Instances

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS		Table A.1.1-1
Study	General Study	ALWAYS		Table A.1.1-2
	Patient Study	ALWAYS		Table A.1.1-3
Series	General Series	ALWAYS		Table A.1.1-4
	CR Series	ALWAYS		Table A.4.1-2
Equipment	General Equipment	ALWAYS		Table A.1.1-5
Acquisition	General Acquisition	ALWAYS		Table A.1.1-6
Image	General Image	ALWAYS		Table A.1.1-7
	General Reference	CONDITIONAL	Only in case of Ortho or Image Recovery.	Table A.1.1-8
	Image Pixel	ALWAYS		Table A.1.1-9
	Contrast/Bolus	CONDITIONAL	If entered by the user.	Table A.1.1-10
	CR Image	ALWAYS		Table A.4.1-3
	Overlay Plane	CONDITIONAL	If entered by the user.	Table A.1.1-11
	Modality LUT	ALWAYS		Table A.4.1-4
	VOI LUT	ALWAYS		Table A.1.1-12
	SOP Common	ALWAYS		Table A.1.1-13
	Common Instance Reference	CONDITIONAL	Only in case of Ortho.	Table A.1.1-14
Private	UIS Common	ALWAYS		Table A.1.3-1
	Image Rejection	ALWAYS		Table A.1.3-2
	Image Presentation	ALWAYS		Table A.1.3-3
	Image Processing	ALWAYS		Table A.1.3-4
	Smart Sensing	ALWAYS		Table A.1.3-5
	Pixel Padding	ALWAYS		Table A.1.3-6

A.4.1 Computed Radiography Image Storage IOD Specific Modules

Table A.4.1-2: CR Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Body Part Examined	(0018,0015)	N/A	N/A	N/A	See General Series Module.	
View Position	(0018,5101)	N/A	N/A	N/A	See General Series Module.	
Filter Type	(0018,1160)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Focal Spot(s)	(0018,1190)	N/A	N/A	N/A	See X-Ray Generation.	

Table A.4.1-3: CR Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Photometric Interpretation	(0028,0004)	N/A	N/A	N/A	See Image Pixel Module.	
KVP	(0018,0060)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Distance Source to Detector	(0018,1110)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Distance Source to Patient	(0018,1111)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Exposure Time	(0018,1150)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
X-Ray Tube Current	(0018,1151)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Exposure	(0018,1152)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Exposure in µAs	(0018,1153)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Imager Pixel Spacing	(0018,1164)	N/A	N/A	N/A	See DX Detector.	
Pixel Spacing	(0028,0030)	N/A	N/A	N/A	See DX Detector.	
Pixel Spacing Calibration Type	(0028,0A02)	N/A	N/A	N/A	See DX Detector.	
Pixel Spacing Calibration Description	(0028,0A04)	N/A	N/A	N/A	See DX Detector.	
Acquisition Device Processing Description	(0018,1400)	N/A	N/A	N/A	See DX Image.	
Acquisition Device Processing Code	(0018,1401)	N/A	N/A	N/A	See DX Image.	
Relative X-Ray Exposure	(0018,1405)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Anatomic Region Sequence	(0008,2218)	N/A	N/A	N/A	See DX Anatomy Imaged.	
>Code Value	(0008,0100)	N/A	N/A	N/A	See DX Anatomy Imaged.	
>Coding Scheme Designator	(0008,0102)	N/A	N/A	N/A	See DX Anatomy Imaged.	
>Code Meaning	(0008,0104)	N/A	N/A	N/A	See DX Anatomy Imaged.	
Exposure Index	(0018,1411)	N/A	N/A	N/A	See DX Detector.	
Target Exposure Index	(0018,1412)	N/A	N/A	N/A	See DX Detector.	
Deviation Index	(0018,1413)	N/A	N/A	N/A	See DX Detector.	

Table A.4.1-4: Modality LUT Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Rescale Intercept	(0028,1052)	FIXED	ALWAYS	ALWAYS	0	
Rescale Slope	(0028,1053)	FIXED	ALWAYS	ALWAYS	1	
Rescale Type	(0028,1054)	FIXED	ALWAYS	ALWAYS	"US"	

A.5 X-Ray Radiation Dose SR Storage IOD

Table A.5-1 defines the structure of X-Ray Radiation Dose SR Storage IOD.

Table A.5-1: X-Ray Radiation Dose SR Storage IOD

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS		Table A.1.1-1
Study	General Study	ALWAYS		Table A.1.1-2
	Patient Study	ALWAYS		Table A.1.1-3
Series	SR Document Series	ALWAYS		Table A.5.1-2
Equipment	General Equipment Module	ALWAYS		Table A.1.1-5
	Enhance General Equipment	ALWAYS		Table A.5.1-3
SR Document	SR Document General	ALWAYS		Table A.5.1-4
	SR Document Content	ALWAYS		Table A.5.1-6
	SOP Common Module	ALWAYS		Table A.1.1-13

A.5.1 X-Ray Radiation Dose SR Storage IOD Specific Modules

The following tables list Modules and Attributes specific for X-Ray Radiation Dose SR Storage IOD:

Table A.5.1-2: SR Document Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Modality	(0008,0060)	FIXED	ALWAYS	ALWAYS	"SR"	
Series Instances UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	The Dose Report is stored in a separate series. There is one Dose Report per Procedure Step.	
Series Number	(0020,0011)	GENERATED	ALWAYS	ALWAYS	For each Dose Report there is an increasing number (starting with 10000)	
Series Date	(0008,0021)	GENERATED	ALWAYS	ALWAYS	Date, when the SR was created for the first time	
Series Time	(0008,0031)	GENERATED	ALWAYS	ALWAYS	Time, when the SR was created for the first time	
Protocol Name	(0018,1030)	GENERATED	ALWAYS	ALWAYS	Name of CP.	
Series Description	(0008,103E)	GENERATED	ALWAYS	ALWAYS	"Radiation Dose Information".	
Referenced Performed Procedure Step Sequence	(0008,1111)	GENERATED	ALWAYS	ALWAYS	Reference to the MPPS object.	
>Referenced SOP Class UID	(0008,1150)	GENERATED	ALWAYS	ALWAYS	„1.2.840.10008.3.1.2.3.3"	
>Referenced SOP Instance UID	(0008,1155)	GENERATED	ALWAYS	ALWAYS	SOP Instance UID of the referenced MPPS object.	

Table A.5.1-3: Enhanced General Equipment Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Manufacturer	(0008,0070)	N/A	N/A	N/A	N/A	See General Equipment Module.
Manufacturer's Model Name	(0008,1090)	N/A	N/A	N/A	N/A	See General Equipment Module.
Device Serial Number	(0018,1000)	N/A	N/A	N/A	N/A	See General Equipment Module.
Software Versions	(0018,1020)	N/A	N/A	N/A	N/A	See General Equipment Module.

Table A.5.1-4: SR Document General Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Instance Number	(0020,0013)	FIXED	ALWAYS	ALWAYS	1	
Completion Flag	(0040,A491)	FIXED	ALWAYS	ALWAYS	COMPLETE	
Verification Flag	(0040,A493)	FIXED	ALWAYS	ALWAYS	UNVERIFIED	
Content Date	(0008,0023)	GENERATED	ALWAYS	ALWAYS	Date, when the content was created.	
Content Time	(0008,0033)	GENERATED	ALWAYS	ALWAYS	Time, when the content was created.	
Author Observer Sequence	(0040,A078)	GENERATED	ALWAYS	ALWAYS	See below.	
>Observer Type	(0040,A084)	FIXED	ALWAYS	ALWAYS	DEV	
>Station Name	(0008,1010)	N/A	N/A	N/A	See General Equipment Module.	
>Device UID	(0018,1002)	GENERATED	ALWAYS	ALWAYS	Device/Product UID	
>Manufacturer	(0008,0070)	N/A	N/A	N/A	See General Equipment Module.	
>Manufacturer's Model Name	(0008,1090)	N/A	N/A	N/A	See General Equipment Module.	
>Station AE Title	(0008,0055)	CONFIG	ALWAYS	ALWAYS	Storage SCU AET of the system.	
>Device Serial Number	(0018,1000)	N/A	N/A	N/A	See General Equipment Module.	
>Software Versions	(0018,1020)	N/A	N/A	N/A	See General Equipment Module.	
>Institution Name	(0008,0080)	N/A	N/A	N/A	See General Equipment Module.	
>Institution Code Sequence	(0008,0082)	GENERATED	ALWAYS	EMPTY	Empty	
>Institutional Department Name	(0008,1040)	N/A	N/A	N/A	See General Equipment Module.	
Referenced Request Sequence	(0040,A370)	GENERATED	CONDITIONAL	ALWAYS	See below.	Required if this Document fulfills at least one Requested Procedure. May be present otherwise
>Accession Number	(0008,0050)	MWL	ALWAYS	ALWAYS	The Accession Number of the RIS procedure.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
>Study Instance UID	(0020,000D)	MWL GENERATED	ALWAYS	ALWAYS	The Study Instance UID of the RIS procedure.	
>Referenced Study Sequence	(0032,1064)	GENERATED	ALWAYS	EMPTY	Empty	
>Placer Order Number/ Imaging Service Request	(0040,2016)	MWL	ALWAYS	CONDITIONAL	The Placer Order Number of the RIS procedure.	Depending on the availability of the data in the MWL.
>Filler Order Number / Imaging Service Request Attribute	(0040,2017)	MWL	ALWAYS	CONDITIONAL	The Filler Order Number of the RIS procedure.	Depending on the availability of the data in the MWL.
>Requested Procedure ID	(0040,1001)	MWL USER	ALWAYS	CONDITIONAL	The Requested Procedure ID of the RIS procedure.	Depending on the availability of the data in the MWL.
>Requested Procedure Description	(0032,1060)	MWL USER	ALWAYS	ALWAYS	The Requested Procedure Description of the RIS procedure.	
>Requested Procedure Code Sequence	(0032,1064)	MWL	CONDITIONAL	CONDITIONAL	The Requested Procedure Code of the.	Depending on the availability of the data in the MWL.
>Reason for the Requested Procedure	(0040,1002)	MWL	CONDITIONAL	CONDITIONAL	The Reason for the Requested Procedure of the RIS procedure.	Depending on the availability of the data in the MWL.
Performed Procedure Code Sequence	(0040,A372)	GENERATED	ALWAYS	EMPTY	Empty	
Current Requested Procedure Evidence Sequence	(0040,A375)	GENERATED	ALWAYS	ALWAYS	Contains all images that were created during this procedure step.	
>Study Instance UID	(0020,000D)	MWL GENERATED	ALWAYS	ALWAYS	The Study Instance UID of the Dose Report and images.	
>Referenced Series Sequence	(0008,1115)	GENERATED	ALWAYS	ALWAYS	All series of this study including the unprocessed images.	
>>Series Instance UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	The Series Instance UID of the corresponding series.	
>>Referenced SOP Sequence	(0008,1199)	GENERATED	ALWAYS	ALWAYS	The Referenced SOP Sequence.	
>>>Referenced SOP Class UID	(0008,1150)	GENERATED	ALWAYS	ALWAYS	SOP Class UID of the referenced image.	
>>>Referenced SOP Instance UID	(0008,1155)	GENERATED	ALWAYS	ALWAYS	SOP Instance UID of the referenced image.	

Table A.5.1-5: SR Document Content Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Value Type	(0040,A040)	FIXED	ALWAYS	ALWAYS	"CONTAINER"	
Concept Name Code Sequence	(0040,A043)	FIXED	ALWAYS	ALWAYS	EV (113701, DCM, "X-Ray Radiation Dose Report")	
Continuity of Content	(0040,A050)	FIXED	ALWAYS	ALWAYS	"SEPARATE"	
Content Template Sequence	(0040,A504)	FIXED	ALWAYS	ALWAYS	N/A	
>Mapping Resource	(0008,0105)	FIXED	ALWAYS	ALWAYS	"DCMR"	
>Template Identifier	(0040,DB00)	FIXED	ALWAYS	ALWAYS	"10001"	
Content Sequence	(0040,A730)	GENERATED	ALWAYS	ALWAYS	See A.5.1-6	

Table A.5.1-6: X-Ray Radiation Dose SR IOD Templates

TID Name	TID	Comments
Projection X-Ray Radiation Dose	10001	See B.1
Accumulated X-Ray Dose	10002	See B.2
Irradiation Event X-Ray Data	10003	See B.3

Annex B Structured Report Content Encoding

This section provides the detailed content encoding for all TIDs supported by YSIO X.pree.

Throughout the tables listed in Annex B the following codes are used for the “Source” and “Presence of Content Item” columns.

In the “Source” column, the following Values can be used:

- FIXED: The Value is pre-defined and cannot be modified.
- GENERATED: The Value is generated by the system.
- CONFIGURATION: The Value is copied from system configuration.
- MWL: The Value is copied from Modality Worklist entry.
- QUERY: The Value is determined by performing a query of any of the supported Query/Retrieve Services.
- USER: The Value is entered by the user.
- SCANNED: The Value is read from a barcode scanner or similar device.
- EMPTY: The Attribute is sent without Value.
- SRC_INSTANCE: The Value is copied from previously created/received SOP Instances.

In the “Presence of Content Item” the following Values can be used:

- ALWAYS: the module, functional group macro, Attributes or Value is always present.
- CONDITIONAL: the presence of the module, functional group macro, Attributes or Value is dependent on a condition. The condition must be listed in the “Comments” column.
- SRC_COPY: The presence of the Attributes and Values depends on the availability of these in the source instances, which are used for copying this information.
- EMPTY: The Attribute is present but without a Value (zero length).

B.1 Projection X-Ray Radiation Dose (TID 10001)

Table B.1-1: Projection X-Ray Radiation Dose (TID 10001)

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
		CONTAINER	EV (113701,DCM,“X-Ray Radiation Dose Report”)”	GENERATED	ALWAYS	N/A	10001	Root node
>	HAS CONCEPT MOD	CODE	EV (121058,DCM, “Procedure reported”)	GENERATED	ALWAYS	DT (113704, DCM, “Projection X-Ray”)	10001	
>>	HAS CONCEPT MOD	CODE	EV (363703001, SCT, "Has Intent")	GENERATED	ALWAYS	EV (261004008, SCT, "Diagnostic Intent")	10001	
>	CONTAINS	CODE	EV (122142,DCM, ”Acquisition Device Type“)	GENERATED	ALWAYS	EV (113958,DCM, ”Integrated Projection Radiography System“)	10001	
>	HAS OBS CONTEXT	CODE	EV (121005,DCM, “Observer Type”)	GENERATED	ALWAYS	EV (121007,DCM, “Device”)	1002	
>	HAS OBS CONTEXT	UIDREF	EV (121012,DCM, “Device Observer UID”)	GENERATED	ALWAYS	Device product UID	1002	
>	HAS OBS CONTEXT	TEXT	EV (121013,DCM, “Device Observer Name”)	CONFIG	ALWAYS	Value from Station Name (0008,1010)	1002	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	HAS OBS CONTEXT	TEXT	EV (121014,DCM, “Device Observer Manufacturer”)	GENERATED	ALWAYS	Value from Manufacturer (0008,0070)	1002	
>	HAS OBS CONTEXT	TEXT	EV (121015,DCM, “Device Observer Model Name”)	GENERATED	ALWAYS	Value from Manufacturer’s Model Name (0008,1090)	1002	
>	HAS OBS CONTEXT	TEXT	EV (121016,DCM, “Device Observer Serial Number”)	CONFIG	ALWAYS	Value from Device Serial Number (0018,1000)	1002	
>	HAS OBS CONTEXT	CODE	EV (121005,DCM, "Observer Type")	USER	CONDITIONAL	EV (121006,DCM, “Person”)	1002	If Operator was entered.
>	HAS OBS CONTEXT	PNAME	EV (121008,DCM, "Person Observer Name")	USER	CONDITIONAL	Same as Operator's Name	1002	
>	HAS OBS CONTEXT	TEXT	EV (121009,DCM, "Person Observer's Organization Name")	CONFIG	CONDITIONAL	Value from Institution Name (0008,0080)	1002	
>	HAS OBS CONTEXT	CODE	EV (121011,DCM, "Person Observer's Role in this Procedure")	FIXED	CONDITIONAL	EV (113851,DCM, “Irradiation Administering”)	1002	
>	HAS OBS CONTEXT	CODE	EV (113705,DCM, "Scope of Accumulation")	GENERATED	ALWAYS	EV (113970, DCM, ”Procedure Step To This Point")	10001	
>>	HAS PROPERTIES	UIDREF	EV (121126,DCM, "Performed Procedure Step SOP Instance UID")	GENERATED	ALWAYS	*Performed Procedure Step SOP Instance UID*	10001	
>	CONTAINS	CODE	EV (113945,DCM, "X-Ray Detector Data Available")	FIXED	ALWAYS	EV("373066001",SCT," Yes")	10001	
>	CONTAINS	CODE	EV (113945,DCM, "X-Ray Detector Data Available")	FIXED	ALWAYS	EV("373066001",SCT," Yes")	10001	
>	CONTAINS	CODE	EV (113945,DCM," X-Ray Detector Data Available")	FIXED	ALWAYS	EV("373066001",SCT," Yes")	10001	
>	CONTAINS	INCLUDE	DTID 10002 “Accumulated X-Ray Dose”	N/A	ALWAYS	See Accumulated X-Ray Dose (TID 10002).	10001	
>	CONTAINS	INCLUDE	DTID 10003 “Irradiation Event X-Ray Data”	N/A	ALWAYS	For each Irradiation Event. See Irradiation Event X-Ray Data (TID 10003).	10001	
>	CONTAINS	TEXT	EV (121106, DCM, “Comment”)	GENERATED	ALWAYS	Formatted dose information. See “Comments on Radiation Dose” (0040,0310) in Table 5.2-2 .	10001	
>	CONTAINS	CODE	EV (113854, DCM, "Source of Dose Information")	FIXED	ALWAYS	EV("15869005",SCT," Dosimeter")	10001	

B.2 Accumulated X-Ray Dose (TID 10002)

Table B.2-2: Accumulated X-Ray Dose (TID 10002)

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
		CONTAINER	EV (113702, DCM, „Accumulated X-Ray Dose Data")	GENERATED	ALWAYS	N/A	10002	Root Node
>	HAS CONCEPT MOD	CODE	EV (113764, DCM, „Acquisition Plane")	FIXED	ALWAYS	EV (113622, DCM, "Single Plane")	10002	
>	CONTAINS	NUM	EV (113722, DCM, "Dose Area Product Total")	GENERATED	ALWAYS	Accumulated dose area product from acquisitions.	10002	
>	CONTAINS	NUM	EV (113725, DCM, "Dose (RP) Total")	GENERATED	ALWAYS	Accumulated entrance dose from acquisitions.	10002	
>	CONTAINS	NUM	EV (113737, DCM, "Distance Source to Reference Point")	GENERATED	ALWAYS	Distance to the Reference Point (RP) defined according to IEC 60601-2-43 or equipment defined.	10002	
>	CONTAINS	NUM	EV (113731, DCM, "Total Number of Radiographic Frames")	GENERATED	ALWAYS	Accumulated count of exposure pulses (single or multi-frame encoded) created from irradiation events performed with high dose (acquisition).	10002	
>	CONTAINS	NUM	EV (113727, DCM, "Acquisition Dose Area Product Total")	GENERATED	ALWAYS	Accumulated dose area product from acquisition only.	10002	
>	CONTAINS	NUM	EV (113729, DCM, "Acquisition Dose (RP) Total")	GENERATED	ALWAYS	Accumulated entrance dose from acquisitions.	10002	
>	CONTAINS	CODE	EV (113780, DCM, "Reference Point Definition")	FIXED	ALWAYS	EV (113984,DCM, "At Surface of patient")	10002	
>	CONTAINS	NUM	EV (113855, DCM, "Total Acquisition Time")	GENERATED	ALWAYS	Total accumulated acquisition clock time in the scope of the including report (sum of the Irradiation Duration values for accumulated acquisition irradiation events).	10002	

B.3 Irradiation Event X-Ray Data (TID 10003)

Table B.3-3: Irradiation Event X-Ray Data (TID 10003)

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
		CONTAINER	EV (113706, DCM, "Irradiation Event X-Ray Data")	GENERATED	ALWAYS	N/A	10003	Root item
>	HAS CONCEPT MOD	CODE	EV (113764, DCM, "Acquisition Plane")	FIXED	ALWAYS	EV (113662, DCM, "Single Plane")	10003	
>	CONTAINS	UIDREF	EV (113769, DCM, "Irradiation Event UID")	GENERATED	ALWAYS	Value from Irradiation Event UID (0008,3010).	10003	
>	CONTAINS	TEXT	EV (113605, DCM, „Irradiation Event Label")	GENERATED	ALWAYS	The label for this Irradiation event. An increasing number starting with 1.	10003	
>	CONTAINS	DATE-TIME	DT (111526, DC", „DateTime Started")	GENERATED	ALWAYS	Date/Time the irradiation event started.	10003	
>	CONTAINS	CODE	EV (113721, DCM, "Irradiation Event Type")	FIXED	ALWAYS	EV (113611, DCM, "Stationary Acquisition")	10003	
>	CONTAINS	TEXT	EV (125203, DCM, "Acquisition Protocol")	USER	ALWAYS	Name of used CP Step	10003	
>	CONTAINS	CODE	EV (111031, DCM, „Image View")	USER	CONDITIONAL	Can be entered by the user. Baseline CID 4010 "DX View". Possible values: EV (399348003,SCT,"antero-posterior") EV (272479007,SCT,"postero-anterior") EV (399182000,SCT,"oblique") EV (399067008,SCT,"lateral")	10003	If entered by the user.
>	CONTAINS	CODE	EV (113745, DCM, „Patient Table Relationship")	USER	CONDITIONAL	Can be entered by the user. The following values are possible: EV(102540008,SCT,"headfirst") EV (102541007,SCT,"feet-first")	10003	
>	CONTAINS	CODE	EV (113743, DCM, "Patient Orientation")	USER	CONDITIONAL	Can be entered by the user. The following values are possible: EV(102538003,SCT,"recumbent") for table acquisitions EV (C86043,NCIt,"erect") for wall acquisitions	10003	
>>	HAS CONCEPT MOD	CODE	EV (113744, DCM, „Patient Orientation Modifier")	USER	CONDITIONAL	Can be entered by the user. The following values are possible: EV (10904000,SCT,"standing") for wall acquisitions EV (1240000,SCT,"prone") for Patient Position "HFP", "FFP"	10003	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
						EV (40199007,SCT,"supine") for Patient Position "HFS","FFS" EV (102535000,SCT,"right lateral decubitus") for Patient Position "HFDR","FFDR" EV (102536004,SCT,"left lateral decubitus") for Patient Position "HFDL","FFDL"		
>	CONTAINS	CODE	EV (123014, DCM, "Target Region")	USER	ALWAYS	Skull => 89546000,SCT,"Skull") Jaw => (661005,SCT,"Jaw Region") C-Spine => 122494005,SCT, "Cervical spine") T-Spine => (122495006,SCT, "Thoracic spine") L-Spine => (122496007,SCT, "Lumbar spine") S-Spine => (54735007,SCT,"Sacrum") Knee => (72696002,SCT,"Knee") Ankle => (70258002,SCT,"Ankle joint") Foot => (56459004,SCT,"Foot") Chest => (51185008,SCT,"Chest") Abdomen => (113345001, SCT, "Abdomen") Shoulder => 16982005,SCT,"Shoulder") Clavicle => (51299004,SCT,"Clavicle") Elbow => (16953009,SCT,"Elbow joint") Hand => (85562004,SCT,"Hand") Pelvis => (12921003,SCT,"Pelvis") Hip => HIP (29836001,SCT,"Hip joint") Forearm => (14975008,SCT,"Forearm") Humerus => (85050009,SCT,"Humerus") Tibia => (12611008,SCT,"Tibia") Femur => (71341001,SCT,"Femur") Vertebral Column => (110517009, SCT, "Vertebral column and cranium") Leg => (416631005,SCT,"Pelvis and lower extremities")	10003	
>>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	USER	CONDITIONAL	Can be entered by the user. Absent if not defined Possible values: R => EV(24028007,SCT,"Right") L=> EV(7771000,SCT,"Left") U=> EV not contained B=> EV(51440002,SCT,"Bilateral")	10003	Only available if entered by user.
>	CONTAINS	NUM	EV (122130, DCM, "Dose Area Product")	GENERATED	ALWAYS	Dose Area Product (in Gy.m2) for this irradiation event.	10003	
>	CONTAINS	CODE or TEXT	EV (113780, DCM, "Reference Point Definition")	FIXED	ALWAYS	EV (113964,DCM,"At Surface of patient")	10003	
>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	GENERATED	ALWAYS	Formatted dose information. Same as "Comment" in "Projection X-Ray Radiation Dose" but only for a single irradiation.	10003	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	CONTAINS	NUM	EV (113845, DCM, “Exposure Index”)	GENERATED	ALWAYS	See „Exposure Index“ in DX Detector.	10003A	
>	CONTAINS	NUM	EV (113846, DCM, “Target Exposure Index”)	CONFIG	ALWAYS	See „Target Exposure Index“ in DX Detector.	10003A	
>	CONTAINS	NUM	EV (113847, DCM, “Deviation Index”)	GENERATED CONFIG	ALWAYS	See „Deviation Index“ in DX Detector.	10003A	
>	CONTAINS	CODE	EV (113876, DCM, "Device Role in Procedure")	FIXED	ALWAYS	EV (113859, DCM, "Irradiating Device")	1021	
>>	HAS PROPERTIES	TEXT	EV (113878, DCM, "Device Manufacturer")	FIXED	ALWAYS	Value from Manufacturer (0008,0070).	1021	
>>	HAS PROPERTIES	TEXT	EV (113879, DCM, "Device Model Name")	FIXED	ALWAYS	Value from Manufacturer’s Model Name (0008,1090)	1021	
>>	HAS PROPERTIES	TEXT	EV (113880, DCM, "Device Serial Number")	CONFIG	ALWAYS	Value from Device Serial Number (0018,1000)	1021	
>>	HAS PROPERTIES	UIDREF	EV (121012, DCM, "Device Observer UID")	GENERATED	ALWAYS	Device/Product UID	1021	
>	CONTAINS	IMAGE	EV (113795, DCM, “Acquired Image”)	GENERATED	ALWAYS	Reference to the image.	10003A	
>	CONTAINS	NUM	EV (113738, DCM, “Dose (RP)”	GENERATED	ALWAYS	Entrance Dose in Gy for this irradiation event.	10003B	
>	CONTAINS	NUM	EV (113768, DCM, “Number of Pulses”)	GENERATED	ALWAYS	Number of Pulses.	10003B	
>	CONTAINS	NUM	EV (113793, DCM, “Pulse Width”)	GENERATED	ALWAYS	Average X-Ray pulse width in ms	10003B	
>	CONTAINS	NUM	EV (113742, DCM, "Irradiation Duration")	GENERATED	ALWAYS	Irradiation Duration in sec	10003B	
>	CONTAINS	NUM	EV (113733, DCM, “KVP”)	GENERATED	ALWAYS	KV	10003B	
>	CONTAINS	NUM	EV (113734, DCM, “X-Ray Tube Current”)	GENERATED	ALWAYS	X-Ray tube current in mA	10003B	
>	CONTAINS	NUM	EV (113824, DCM, “Exposure Time”)	GENERATED	ALWAYS	Exposure Time in ms	10003B	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	CONTAINS	NUM	EV (113736, DCM, “Exposure”)	GENERATED	ALWAYS	µAs	10003B	
>	CONTAINS	NUM	EV (113766, DCM, "Focal Spot Size")	GENERATED	ALWAYS	Focal spot size in mm.	10003B	
>	CONTAINS	CONTAINER	EV (113771, DCM, “X-Ray Filters”)	GENERATED	ALWAYS	N.a.	10003B	
>>	CONTAINS	CODE	EV (113772, DCM, “X-Ray Filter Type”)	GENERATED	ALWAYS	EV (111609,DCM,”No Filter”) in case no copper filter was inserted, otherwise EV (113650,DCM,”Strip filter”)	10003B	
>>	CONTAINS	CODE	EV (113757, DCM, “X-Ray Filter Material”)	GENERATED	CONDITIONAL	EV (C-127F9,SRT, ”Copper or Copper compound") EV (105837005,SCT, "Copper or Copper compound")	10003B	If copper filter was used.
>>	CONTAINS	NUM	EV (113758, DCM, “X-Ray Filter Thickness Minimum”)	GENERATED	CONDITIONAL	Thickness of copper filter. 0 in case no filter was used.	10003B	
>>	CONTAINS	NUM	EV (113773, DCM, “X-Ray Filter Thickness Maximum”)	GENERATED	CONDITIONAL	Thickness of copper filter. 0 in case no filter was used.	10003B	
>	CONTAINS	NUM	EV (113790, DCM, "Collimated Field Area")	GENERATED	ALWAYS	Collimated field area at image receptor.	10003B	
>	CONTAINS	NUM	EV (113788, DCM, "Collimated Field Height")	GENERATED	ALWAYS	Distance between the collimator blades in pixel column direction as projected at the detector plane.	10003B	
>	CONTAINS	NUM	EV (113789, DCM, "Collimated Field Width")	GENERATED	ALWAYS	Distance between the collimator blades in pixel row direction as projected at the detector plane.	10003B	
>	CONTAINS	CODE	EV (111635, DCM, "X-Ray Grid")	GENERATED	ALWAYS	EV (DCM,111642,"Focused grid") in case of focused grid EV (DCM,111646,"No grid") in case of no grid	10003B	
>	CONTAINS	CODE	EV (113956, DCM, "CR/DR Mechanical Configuration")	GENERATED	ALWAYS	EV (DCM,113953,"Unmounted detector") in case of free exposures EV (DCM,113952,"Table Mount") in case of table acquisitions EV (DCM,113954,"Upright Stand Mount" in case of wall stand acquisitions	10003C	
>	CONTAINS	NUM	EV (113750, DCM”, "Distance Source to Detector")	GENERATED	CONDITIONAL	Distance in mm from source to detector center. Also known as SID (Source Image Distance).	10003C	Only set in case it is known, otherwise not contained. CID 10008 “Dose Related Distance Measurement”

Annex C Security Details

This section provides additional details about security features that are formally described in Section 8.

C.1 External Network Requirement Details

C.1.1 Basic Time Synchronization

YSIO X.pree acts as an NTP Client in the Maintain Time Transaction.

C.1.2 Basic Network Address Management

The Network API of the Operation System is responsible for the discovery of the DHCP Server. YSIO X.pree is operable in a DHCP environment but must be equipped with a fixed IP address.

C.1.3 Application Configuration Management

N/A

C.1.4 DNS Service Discovery

The DNS Service is discovered based on the Network API and the Network Settings of the Operation System.

The DNS Service accessed via the Operation System is used for resolving host names to IP Addresses (for example during the configuration of a Remote Node).

C.2 DICOM Security Profile Details

C.2.1 Online Electronic Storage Secure Use

Remote Access is restricted on User Level. This is done on the Operation System level.

C.2.2 Audit Trail Messages

Table C.2.2-1 specifies the DICOM Audit Messages that YSIO X.pree can detect and report. It defines the list of triggers that will cause the Audit Message to be generated if these triggers can be configured or not. It also specifies whether the content of the Audit Message can be configured or not.

Table C.2.2-1: DICOM Specific Audit Messages

Audit Message	Used	Supported Triggers	Configurable Triggers	Configurable Message	Comments
Application Activity	Y	Application Start Application Stop	N	N	
Audit Log Used	N		N	N	
Begin Transferring DICOM Instances	Y	Send	N	N	
Data Export	Y	Export	N	N	
Data Import	Y	Import	N	N	
DICOM Instance Accessed	Y	Update Delete	N	N	
DICOM Instance Transferred	Y	Receive	N	N	
DICOM Study Deleted	Y	Deleted	N	N	
Network Entry	N		N	N	
Query	Y	Query	N	N	
Security Alert	Y	Software Configuration Node Authentication Failed	N	N	
User Authentication	Y	Login Login Failed	N	N	
Order Record	N		N	N	
Patient Record	Y	Delete	N	N	
Procedure Record	N		N	N	
[Other Message]	Y	Study updated Study moved Series moved Series merge Series split Series copied	N	N	

Table C.2.2-2 specifies the implementation details of each audit message supported by this product.

Table C.2.2-2: Audit Message Details – Export

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110106, DCM, "Export")
	EventActionCode	Y	R
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure

Real-World Entities	Field Name	Supported	Value Constraints
			8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant (Remote Users and Processes)	UserID	Y	Provided by the Operating System
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110152, DCM, “Destination Role ID”)
	NetworkAccessPointID	N	
	NetworkAccessPointTypeCode	N	
Active Participant (User or Process Exporting the Data)	UserID	Y	<platform_id>, <product_serial_number>
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	Y	EV (110153, DCM, “Source Role ID”)
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The Machin Name
Active Participant (Media)	UserID	Y	Destination Directory
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110154, DCM, "Destination Media")
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
	MediaIdentifier	N	
	MediaType	N	
Audit Log Used Message			
Participating Object (Studies)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, “Study Instance UID”)
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	Y	The SOP Class UID
	Accession Number	Y	“Value not set”
	NumberOfInstances	Y	The number of instances exported
	Instances	N	
	Encrypted	N	
	Anonymized	Y	false
Participating Object (Patients)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>, <product_serial_number>

Table C.2.2-3: Audit Message Details – Import

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110107, DCM, "Import")
	EventActionCode	Y	C
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant (Users or Processes Importing the data)	UserID	Y	<platform_id>, <product_serial_number>
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	Y	EV (110152, DCM, “Destination Role ID”)
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The Machine Name
Active Participant (Source Media)	UserID	Y	The Source Folder
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110155, DCM, “Source Role ID”)
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointTypeID	N	
	MediaIdenfifier	N	
	MediaType	N	
Active Participant (Source)	UserID	Y	The User ID as provided by the Operation System
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false

Real-World Entities	Field Name	Supported	Value Constraints
	RoleIDCode	Y	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Object (Studies)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	Y	The SOP Class UID
	Accession Number	Y	"Value not set"
	NumberOfInstances	Y	The Number of Instances imported
	Instances	N	
	Encrypted	N	
	Anonymized	N	
Participating Object (Patients)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Other Messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>, <product_serial_number>

Table C.2.2-4: Audit Message Details – DICOM Instance Accessed

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110103, DCM, "DICOM Instances Accessed")
	EventActionCode	Y	C – Create R – Read U – Update D – Delete
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant (Persons and or Programs manipulating the data)	UserID	Y	User or Process Identification provided by the Operating System
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Studies)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, “Study Instance UID”)
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	Y	The SOP Class UID
	Accession Number	Y	“ “
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Object (Patient)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Participating Object (User)	ParticipantObjectID	Y	User
	ParticipantObjectIDTypeCode	Y	EV (1, DCM, "")
	Type	Y	UserDefinedText
	Value	Y	The encoded description of what happened
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>, <product_serial_number>

Table C.2.2-5: Audit Message Details – Begin Transferring DICOM Instances

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110102, DCM, "Begin Transferring DICOM Instances")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant (Process sending the data)	UserID	Y	The Source Machine Name
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	N	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	N	2
	NetworkAccessPointID	N	The IP Address of the Source Machine
Active Participant (Process receiving the data)	UserID	Y	The Destination Machine Name
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The IP Address of the Destination Machine
Active Participant (Other Participants)	UserID	Y	The User ID as provided by the Operation System
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	False

Real-World Entities	Field Name	Supported	Value Constraints
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Studies being transferred)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	Y	The SOP Class UID
	Accession Number	Y	" "
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Object (Patient)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>, <product_serial_number>

Please note: This is the Audit Log message generated in case of a DICOM Send on the sender side.

Table C.2.2-6: Audit Message Details –DICOM Instances Transferred

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	Y	C – Create R – Read U – Update
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant (Process that sent the data)	UserID	Y	The Source Machine Name
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The IP Address of the Source Machine
Active Participant (Process that received the data)	UserID	Y	The Destination Machine Name
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The IP Address of the Destination Machine
Active Participant (Other participants that are known, especially third parties that are the requestor)	UserID	Y	The ID of the receiving process
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Studies being transferred)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, “Study Instance UID”)
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectDescription	N	
	SOP Class UID	Y	The SOP Class UID
	Accession Number	Y	"Value not set"
	NumberOfInstances	Y	The number of Instances transferred
	Encrypted	N	
	Anonymized	N	
Participating Object (Patient)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>, <product_serial_number>

Please note: This is the Audit Log Message for the DICOM Receive. The same message is generated in case of a DICOM Retrieve on the receiving side.

Table C.2.2-7: Audit Message Details –DICOM Study Deleted

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110105, DCM, "DICOM Study Deleted")
	EventActionCode	Y	D – Delete
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant	UserID	Y	The User Name
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	False
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	

Audit Log Used Message			
Participating Objects (Studies being transferred)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, “Study Instance UID”)
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	Y	“ ”
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Object (Patient)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	SyngoDataManagement

Table C.2.2-8: Audit Message Details –DICOM Study Deleted

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110105, DCM, "DICOM Study Deleted")
	EventActionCode	Y	D
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
	UserID	Y	The User ID provided by the Operation System
	AlternativeUserID	N	

Real-World Entities	Field Name	Supported	Value Constraints
Active Participant (The Person or Process deleting the Study)	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Studies being transferred)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, “Study Instance UID”)
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Study Instance UID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	Y	“ ”
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Object (Patient)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Participating Object (Patient Name)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110187, DCM, “Patient Name”)
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient Name
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	

Real-World Entities	Field Name	Supported	Value Constraints
Participating Object (Patient's Sex)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110188, DCM, "Patient Sex")
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient's Sex
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Participating Object (Patient's Date of Birth)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110189, DCM, "Patient Date of Birth")
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient's Date of Birth
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Participating Object (User Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient's Date of Birth
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	UserDefinedText	Y	An encoded Text describing, what happened (e.g. "Study deleted")
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	SyngoDataManagement

Table C.2.2-9: Audit Message Details – Patient Record

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110110, DCM, "Patient Record")
	EventActionCode	Y	C – Create R – Read U – Update D – Delete
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
User	UserID	Y	The User ID provided by the Operation System
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Object (Patient)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	The Module, which performed the action audited

Table C.2.2-10: Audit Message Details – Query

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110112, DCM, "Query")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 – Success 4 – Minor Failure 8 – Serious Failure 12 – Major Failure
	EventTypeCode	N	
Active Participant (Process Issuing the Query)	UserID	Y	The Name of the Machine that sends the query
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The IP Address of the Machine, that sends the Query
Active Participant (The process, that will respond to the query)	UserID	Y	The Machine Name
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The IP Address of the Remote Node, that sends the Query
Active Participant Other Participants that are known, especially third parties that requested the query	UserID	Y	The ID of the Process processing the Query
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	False
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (SOP Queried and the Query)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	DT (110181, DCM, "SOP Class UID")
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	If the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID"), then this field shall hold the UID of the SOP Class being queried
	ParticipantObjectName	N	
	ParticipantObjectQuery	Y	If the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID"), then this field shall hold the Dataset of the DICOM query,

Real-World Entities	Field Name	Supported	Value Constraints
			xs:base64Binary encoded. Otherwise, it shall be the query in the format of the protocol used.
	ParticipantObjectDetail	Y	A ParticipantObjectDetail element with the XML attribute "TransferSyntax" shall be present. The value of the Transfer Syntax attribute shall be the UID of the transfer syntax of the query. The element contents shall be xs:base64Binary encoding. The Transfer Syntax shall be a DICOM Transfer Syntax.
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>, <product_serial_number>

Table C.2.2-11: Audit Message Details – Security Alert (Remote DICOM Node configuration changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, “Software Configuration”)
Active Participant (Reporting Person and/or Process)	UserID	Y	The User logged in on the Administration Portal or “Servicekey_login”.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	N	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Remote Node
	ParticipantObjectName	N	

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the Remote DICOM Node Configuration
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	N	“User”
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the Remote DICOM Node Configuration
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	“ServiceSoftware”

Table C.2.2-12: Audit Message Details – Security Alert (Remote DICOM Node encryption setting changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, “Software Configuration”)
Active Participant (Reporting Person and/or Process)	UserID	Y	The User logged in on the Administration Portal or “Servicekey_login”.
	AlternativeUserID	N	
	UserName	N	

Real-World Entities	Field Name	Supported	Value Constraints
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Remote Node
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encryption setting of the Remote Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	“User”
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encryption setting of the Remote Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	“ServiceSoftware”

Table C.2.2-13: Audit Message Details – Security Alert (Local DICOM Node encryption setting changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
Active Participant (Reporting Person and/or Process)	UserID	Y	The User logged in on the Administration Portal or "Servicekey_login".
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Local Node
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encryption setting of the Local Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	"User"
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encryption setting of the Local Node

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	"ServiceSoftware"

Table C.2.2-14: Audit Message Details – Security Alert (Remote DICOM Node encapsulation setting changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
Active Participant (Reporting Person and/or Process)	UserID	Y	The User logged in on the Administration Portal or "Servicekey_login".
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	N	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Remote Node
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encapsulation setting of the Local Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	

Real-World Entities	Field Name	Supported	Value Constraints
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	"User"
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encapsulation setting of the Local Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	"ServiceSoftware"

Table C.2.2-15: Audit Message Details – Security Alert (Remote DICOM Node authentication failed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	4
	EventTypeCode	Y	EV (110126, DCM, "Node Athentication")
Active Participant (Reporting Person and/or Process)	UserID	Y	The IP Address of the initiator if a remote system initiated the communication. The User ID as <login_name>@<domain_name> if the local system initiated the communication
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	

Real-World Entities	Field Name	Supported	Value Constraints
	NetworkAccessPointID	N	
Active Participant (Performing Person or Process)	UserID	Y	"Remote Peer" if a remote system initiated the communication. The User ID as <login_name>@<domain_name> if the local system initiated the communication
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110150, DCM, "Application")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	The IP Address
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Remote Node
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encapsulation setting of the Local Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	12
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The base64 encoded description of the current Status of the encapsulation setting of the Local Node
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	

Real-World Entities	Field Name	Supported	Value Constraints
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	“DCM”

Table C.2.2-16: Audit Message Details – Security Alert (Passphrase for auto connect secure communication set)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, “Software Configuration”)
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or “Servicekey_login” if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Transfer Preferences
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	“Passphrase saved for SmartConnect secure communication.”, base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	

Real-World Entities	Field Name	Supported	Value Constraints
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	N	
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	"Passphrase saved for SmartConnect secure communication.", base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	"Service Software"

Table C.2.2-17: Audit Message Details – Security Alert (Auto connect secure communication service state changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or "Servicekey_login" if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Transfer Preferences
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The current state of the auto connect secure communication service, base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	N	
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The current state of the auto connect secure communication service, base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	“Service Software”

Table C.2.2-18: Audit Message Details – Security Alert (Auto connect secure communication connection option changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or "Servicekey_login" if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The name of the configuration file for the Transfer Preferences
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The current state of the auto connect secure communication connection option, base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	N	
	ParticipantObjectName	N	

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The current state of the auto connect secure communication connection option, base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	"Service Software"

Table C.2.2-19: Audit Message Details – Security Alert (Storage Commitment Service is enabled or disabled for a Remote Node)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or "Servicekey_login" if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	"Archiving and Deletion Configuration"
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The current status of the Storage Commitment Service for the Remote Node, base64 encoded

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	“Service Software”

Table C.2.2-20: Audit Message Details – Security Alert (Certificate was unpinned from a Remote Node)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, “Software Configuration”)
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or “Servicekey_login” if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	“Archiving and Deletion Configuration”
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The user has decided to delete the existing pinning for the Remote Node Name: <remote_node_name>, IP Address: <remote_node_ip_address>. The following pinned certificate ID has been unpinned: <unpinned_certificate_id>.
	ParticipantObjectDescription	N	

Real-World Entities	Field Name	Supported	Value Constraints
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>. <product_serial_number>

Table C.2.2-21: Audit Message Details – Security Alert (Certificate was pinned to a Remote Node)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or "Servicekey_login" if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	"Archiving and Deletion Configuration"
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The user has decided to trust and pin a certificate for the Remote Node Name: <remote_node_name>, IP Address: <remote_node_ip_address>. Certificate details: Issuer: <certificate_issuer>, Subject: <certificate_subject>, Not Before <certificate_not_before>, Not After: <certificate_not_after>,

Real-World Entities	Field Name	Supported	Value Constraints
			Thumbprint: <certificate_thumbprint>, Version: <certificate_version>. The following certificate ID has been pinned: <pinned_certificate_id>.
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	<platform_id>. <product_serial_number>

Table C.2.2-22: Audit Message Details – Security Alert (Archive marking of a Remote Node has changed)

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, “Software Configuration”)
Active Participant (Reporting Person and/or Process)	UserID	Y	The User ID as <login_name>@<domain_name> if the local system initiated the communication or “Servicekey_login” if a Service Key was used by the user authentication.
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Participating Objects (Alert Subject)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	12
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The configuration file for the Remote Node modified
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The status of the Archive markings, base64 encoded

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Participating Objects (User Defined Text)	ParticipantObjectTypeCode	N	
	ParticipantObjectTypeCodeRole	N	
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	1
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	N	
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	Y	The status of the Archive markings, base64 encoded
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	“Service Software”

Table C.2.2-23: Audit Message Details – User Authentication

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110114, DCM, "User Authentication")
	EventActionCode	Y	E
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0 or 4
	EventTypeCode	Y	EV (110122, DCM, “Login”)
Active Participant (Person authenticated or claimed)	UserID	Y	The ID of the User requesting authentication
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	Y	1

Real-World Entities	Field Name	Supported	Value Constraints
	NetworkAccessPointID	Y	""
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	"Service Software"

Table C.2.2-24: Audit Message Details – Patient Record

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110110, DCM, "Patient Record")
	EventActionCode	Y	C – create R – read U – update D – delete
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	N	
	EventTypeCode	N	
User	UserID	Y	The ID of the User requesting authentication
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Patient	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	N	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
Other messages			
Audit Source Identification	AuditEnterpriseSiteID	Y	The Machine Name
	AuditSourceID	Y	"Workflow"

Table C.2.2-25: Audit Message Details – Patient Record

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110111, DCM, " Procedure Record")
	EventActionCode	Y	C – create R – read U – update D – delete
	EventDateTime	Y	Current date and Time
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110131, DCM, "Software Configuration")
User	UserID	Y	The ID of the User
	AlternativeUserID	N	
	UserName	N	
	UserIsRequestor	Y	true
	RoleIDCode	N	
	NetworkAccessPointTypeCode	N	
	NetworkAccessPointID	N	
Audit Log Used Message			
Study	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The ID of the acting Workflow
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	
	ParticipantObjectDescription	Y	""
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Patient	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectDataLifeCycle	N	
	ParticipantObjectIDTypeCode	Y	2
	ParticipantObjectSensitivity	N	
	ParticipantObjectID	Y	The Patient ID
	ParticipantObjectName	N	
	ParticipantObjectQuery	N	
	ParticipantObjectDetail	N	

Real-World Entities	Field Name	Supported	Value Constraints
	ParticipantObjectDescription	N	
	SOP Class UID	N	
	Accession Number	N	
	NumberOfInstances	N	
	Encrypted	N	
	Anonymized	N	
Other messages			
AuditSourceIdentification	AuditEnterpriseSiteID	Y	Machine Name
	AuditSourceID	Y	"Workflow"

C.2.3 Audit Trail Message Transmission Profile – SYSLOG – TLS

Currently only RFC 3164 is supported for Audit Trail Message Transmission.

To avoid sniffing attacks and disclosure of audit trail logs, please set the Secure TCP protocol. Encrypted transmission is possible only if the Secure TCP protocol is selected and a certificate is referenced by its thumbprint.

C.2.4 Audit Trail Message Transmission Profile – SYSLOG – UDP

Currently only RFC 3164 is supported for Audit Trail Message Transmission.

To avoid sniffing attacks and disclosure of audit trail logs, please set the Secure TCP protocol. Encrypted transmission is possible only if the Secure TCP protocol is selected and a certificate is referenced by its thumbprint.

C.2.5 Secure Transport Connection Details

YSIO X.pree uses the default Cipher Suite selected automatically by the Operation System, which does not permit to specify a certain Cipher Suite to be used. For further details please refer to https://learn.microsoft.com/en-us/windows/win32/secauthn/tls-cipher-suites-in-windows-10-v1903 and https://learn.microsoft.com/en-us/dotnet/core/extensions/sslstream-best-practices.

C.2.6 Attribute Confidentiality Details

De-Identification is not supported in YSIO X.pree. As an alternative the Data Minimization Feature is provided.

C.2.7 Digital Signature Details

N/A

C.2.8 Additional DICOM Security Profile Details

N/A

Annex D Mapping of Attributes

D.1 Mapping between Modality Worklist, Instances and MPPS

How attributes are mapped between Modality Worklist, Instances and MPPS is described in the corresponding tables in 5.2.2 and Annex A.

Annex E Code Set Usage

N/A

Annex F DICOM Print SCU – Detailed Status Displays

The following tables document the behavior of the YSIO X.pree DICOM Print AE in response to messages received for the printer SOP class and the print job SOP class.

F.1 Common Execution Status Information

Table F-1: Common Printer Status Information

Printer Status Info/ Execution Status Info	Description	Message string visible in Logs
NORMAL	Camera is ready	Camera is ready
BAD RECEIVE MGZ	There is a problem with the film receive magazine. Films from the printer cannot be transported into the magazine.	Problem with receive magazine.
BAD SUPPLY MGZ	There is a problem with the film supply magazine. Films from this magazine cannot be transported into the printer.	Problem with supply magazine.
CALIBRATING	Printer is performing self calibration, it is expected to be available for normal operation shortly.	Self calibration. Please wait.
CALIBRATION ERR	An error in the printer calibration has been detected, quality of processed films may not be optimal.	Problem in calibration. Film quality may not be optimal.
CHECK CHEMISTRY	A problem with the processor chemicals has been detected, quality of processed films may not be optimal.	Problem with chemistry. Film quality may not be optimal.
CHECK SORTER	There is an error in the film sorter.	Error in film sorter.
CHEMICALS EMPTY	There are no processing chemicals in the processor, films will not be printed and processed until the processor is back to normal.	Camera chemistry empty. Please check.
CHEMICALS LOW	The chemical level in the processor is low, if not corrected, it will probably shut down soon.	Camera chemistry low. Please check.
COVER OPEN	One or more printer or processor covers, drawers, doors are open.	Camera cover, drawer or door open.
ELEC CONFIG ERR	Printer configured improperly for this job.	Camera configured improperly for this job. Queue stopped.
ELEC DOWN	Printer is not operating due to some unspecified electrical hardware problem.	Camera electrical hardware Problem.
ELEC SW ERROR	Printer not operating for some unspecified software error.	Camera software problem. Queue stopped.
EMPTY 8X10	The 8x10 inch film supply magazine is empty.	8x10 film supply empty.
EMPTY 8X10 BLUE	The 8x10 inch blue film supply magazine is empty.	8x10 blue film supply empty.
EMPTY 8X10 CLR	The 8x10 inch clear film supply magazine is empty.	8x10 clear film supply empty.
EMPTY 8X10 PAPR	The 8x10 inch paper supply magazine is empty.	8x10 paper supply empty.
EMPTY 10X12	The 10x12 inch film supply magazine is empty.	10x12 film supply empty.
EMPTY 10X12 BLUE	The 10x12 inch blue film supply magazine is empty.	10x12 blue film supply empty.
EMPTY 10X12 CLR	The 10x12 inch clear film supply magazine is empty.	10x12 clear film supply empty.
EMPTY 10X12 PAPR	The 10x12 inch paper supply magazine is empty.	10x12 paper supply empty.
EMPTY 10X14	The 10x14 inch film supply magazine is empty.	10x14 film supply empty.
EMPTY 10X14 BLUE	The 10x14 inch blue film supply magazine is empty.	10x14 blue film supply empty.
EMPTY 10X14 CLR	The 10x14 inch clear film supply magazine is empty.	10x14 clear film supply empty.
EMPTY 10X14 PAPR	The 10x14 inch paper supply magazine is empty.	10x14 paper supply empty.
EMPTY 11X14	The 11x14 inch film supply magazine is empty.	11x14 film supply empty.
EMPTY 11X14 BLUE	The 11x14 inch blue film supply magazine is empty.	11x14 blue film supply empty.
EMPTY 11X14 CLR	The 11x14 inch clear film supply magazine is empty.	11x14 clear film supply empty.

Printer Status Info/ Execution Status Info	Description	Message string visible in Logs
EMPTY 11X14 PAPR	The 11x14 inch paper supply magazine is empty.	11x14 paper supply empty.
EMPTY 14X14	The 14x14 inch film supply magazine is empty.	14x14 film supply empty.
EMPTY 14X14 BLUE	The 14x14 inch blue film supply magazine is empty.	14x14 blue film supply empty.
EMPTY 14X14 CLR	The 14x14 inch clear film supply magazine is empty.	14x14 clear film supply empty.
EMPTY 14X14 PAPR	The 14x14 inch paper supply magazine is empty.	14x14 paper supply empty.
EMPTY 14X17	The 14x17 inch film supply magazine is empty.	14x17 film supply empty.
EMPTY 14X17 BLUE	The 14x17 inch blue film supply magazine is empty.	14x17 blue film supply empty.
EMPTY 14X17 CLR	The 14x17 inch clear film supply magazine is empty.	14x17 clear film supply empty.
EMPTY 14X17 PAPR	The 14x17 inch paper supply magazine is empty.	14x17 paper supply empty.
EMPTY 24X24	The 24x24 inch film supply magazine is empty.	24x24 film supply empty.
EMPTY 24X24 BLUE	The 24x24 inch blue film supply magazine is empty.	24x24 blue film supply empty.
EMPTY 24X24 CLR	The 24x24 inch clear film supply magazine is empty.	24x24 clear film supply empty.
EMPTY 24X24 PAPR	The 24x24 inch paper	24x24 paper supply empty
	supply magazine is empty.	
EMPTY 24X30	The 24x30 inch film supply magazine is empty.	24x30 film supply empty.
EMPTY 24X30 BLUE	The 24x30 inch blue film supply magazine is empty.	24x30 blue film supply empty.
EMPTY 24X30 CLR	The 24x30 inch clear film supply magazine is empty.	24x30 clear film supply empty.
EMPTY 24X30 PAPR	The 24x30 inch paper supply magazine is empty.	24x30 paper supply empty.
EMPTY A4 PAPR	The A4 paper supply magazine is empty.	A4 paper supply empty.
EMPTY A4 TRANS	The A4 transparency supply magazine is empty.	A4 transparency supply empty.
EXPOSURE FAILURE	The exposure device has failed due to some unspecified reason.	Exposure device has failed.
FILM JAM	A film transport error has occurred and a film is jammed in the printer or processor.	Film jam.
FILM TRANSP ERR	There is a malfunction with the film transport, there may or may not be a film jam.	Film transport problem.
FINISHER EMPTY	The finisher is empty.	Finisher is empty.
FINISHER ERROR	The finisher is not operating due to some unspecified reason	Finisher problem.
FINISHER LOW	The finisher is low on supplies.	Finisher low.
LOW 8X10	The 8x10 inch film supply magazine is low.	8x10 film supply low.
LOW 8X10 BLUE	The 8x10 inch blue film supply magazine is low.	8x10 blue film supply low.
LOW 8X10 CLR	The 8x10 inch clear film supply magazine is low.	8x10 clear film supply low.
LOW 8X10 PAPR	The 8x10 inch paper supply magazine is low.	8x10 paper supply low.
LOW 10X12	The 10x12 inch film supply magazine is low.	10x12 film supply low.
LOW 10X12 BLUE	The 10x12 inch blue film supply magazine is low.	10x12 blue film supply low.
LOW 10X12 CLR	The 10x12 inch clear film supply magazine is low.	10x12 clear film sup-ply low.
LOW 10X12 PAPR	The 10x12 inch paper supply magazine is low.	10x12 paper supply low.
LOW 10X14	The 10x14 inch film supply magazine is low.	10x14 film supply low.
LOW 10X14 BLUE	The 10x14 inch blue film supply magazine is low.	10x14 blue film supply low.
LOW 10X14 CLR	The 10x14 inch clear film supply magazine is low.	10x14 clear film supply low.
LOW 10X14 PAPR	The 10x14 inch paper supply magazine is low.	10x14 paper supply low.
LOW 11X14	The 11x14 inch film supply magazine is low.	11x14 film supply low.
LOW 11X14 BLUE	The 11x14 inch blue film supply magazine is low.	11x14 blue film supply low.
LOW 11X14 CLR	The 11x14 inch clear film supply magazine is low.	11x14 clear film supply low.
LOW 11X14 PAPR	The 11x14 inch paper supply magazine is low.	11x14 paper supply low.
LOW 14X14	The 14x14 inch film supply magazine is low.	14x14 film supply low.

Printer Status Info/ Execution Status Info	Description	Message string visible in Logs
LOW 14X14 BLUE	The 14x14 inch blue film supply magazine is low.	14x14 blue film supply low.
LOW 14X14 CLR	The 14x14 inch clear film supply magazine is low.	14x14 clear film supply low.
LOW 14X14 PAPR	The 14x14 inch paper supply magazine is low.	14x14 paper supply low.
LOW 14X17	The 14x17 inch film supply magazine is low.	14x17 film supply low.
LOW 14X17 BLUE	The 14x17 inch blue film supply magazine is low.	14x17 blue film supply low.
LOW 14X17 CLR	The 14x17 inch clear film supply magazine is low.	14x17 clear film supply low.
LOW 14X17 PAPR	The 14x17 inch paper supply magazine is low.	14x17 paper supply low.
LOW 24X24	The 24x24 inch film supply magazine is low.	24x24 film supply low.
LOW 24X24 BLUE	The 24x24 inch blue film supply magazine is low.	24x24 blue film supply low.
LOW 24X24 CLR	The 24x24 inch clear film supply magazine is low.	24x24 clear film supply low.
LOW 24X24 PAPR	The 24x24 inch paper supply magazine is low.	24x24 paper supply low.
LOW 24X30	The 24x30 inch film supply magazine is low.	24x30 film supply low.
LOW 24X30 BLUE	The 24x30 inch blue film supply magazine is low.	24x30 blue film supply low.
LOW 24X30 CLR	The 24x30 inch clear film supply magazine is low.	24x30 clear film supply low.
LOW 24X30 PAPR	The 24x30 inch paper supply magazine is low.	24x30 paper supply low.
LOW A4 PAPR	The A4 paper supply magazine is low.	A4 paper supply low.
LOW A4 TRANS	The A4 transparency supply magazine is low.	A4 transparency supply low.
NO RECEIVE MGZ	The film receive magazine is not available.	Film receiver not available.
NO RIBBON	The ribbon cartridge needs to be replaced.	Replace ribbon cartridge.
NO SUPPLY MGZ	The film supply magazine is not available.	Film supply not available.
CHECK PRINTER	The printer is not ready at this time, operator intervention is required to make the printer available.	Check camera.
CHECK PROC	The processor is not ready at this time, operator intervention is required to make the printer available.	Check processor.
PRINTER DOWN	The printer is not operating due to some unspecified reason.	Camera down.
PRINTER INIT	The printer is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state.	Camera initializing.
PRINTER OFFLINE	The printer has been disabled by an operator or service person	Camera off-line.
PROC DOWN	The processor is not operating due to some unspecified reason.	Processor down.
PROC INIT	The processor is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state.	Processor initializing.
PROC OVERFLOW FL	Processor chemicals are approaching the overflow full mark.	Processor chemicals near overflow.
PROC OVERFLOW HI	Processor chemicals have reached the overflow full mark.	Processor chemicals overflow.
QUEUED	Print job in Queue	--
RECEIVER FULL	The film receive magazine is full.	Receiver full.
REQ MED NOT INST	The requested film, paper, or other media supply magazine is installed in the printer, but may be available with operator intervention.	Install media supply.
REQ MED NOT AVAI	The requested film, paper, or other media requested is not available on this printer.	Media supply not available on this camera. Queue stopped. Change camera.
RIBBON ERROR	There is an unspecified problem with the print ribbon.	Error with print ribbon.
SUPPLY EMPTY	The printer is out of film.	Camera out of film.
SUPPLY LOW	The film supply is low.	Film supply low.
UNKNOWN	There is an unspecified problem.	Unspecified problem with camera.

F.2 Additional Execution Status Information

Printer Status Info and Execution Status Info are defined terms and can therefore be extended or reduced by camera manufacturers. Therefore YSIO X.pree shall be flexible.

If any other printer status info or execution status info is received (as described in Table 9.7.1, YSIO X.pree will react as shown in the following table.

Table F-1: Additional Printer Status Information

Printer Status/ Execution	Printer / Execution Status Info	Description	Message string visible in Logs
WARNING		Camera is ready	Camera is ready
FAILURE		There is a problem with the film receive magazine. Films from the printer cannot be transported into the magazine.	Problem with receive magazine.

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